Blood safety in the COVID-19 era: Is there need for concern?

Dr. Valerie Magutu
Unit of Haematology and Blood Transfusion,
Department of Human Pathology
University of Nairobi

Outline

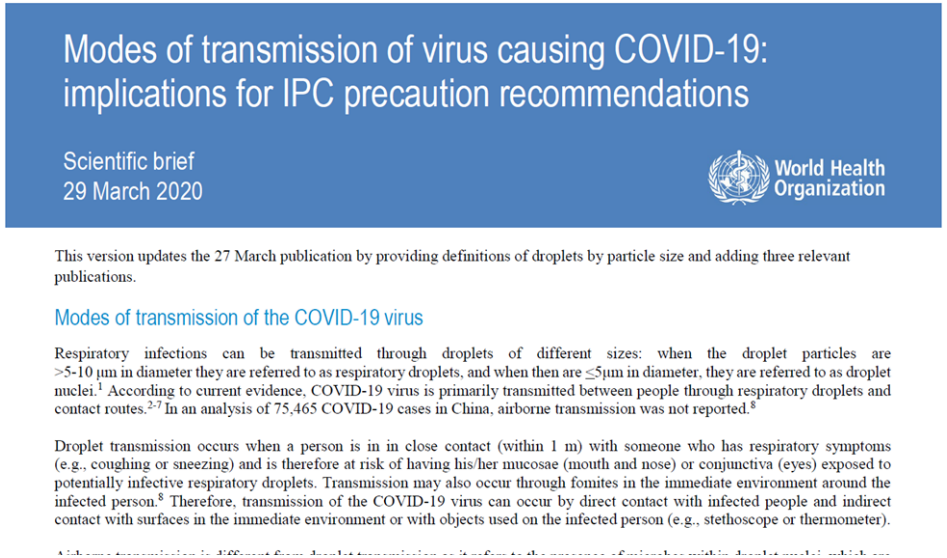
- Introduction
- Assessing a pathogens impact on blood safety and supply
- Risk assessment
- Suggested mitigation measures

Introduction

- Coronavirus disease 2019 (COVID-19) is caused by a novel coronavirus- severe acute respiratory syndrome- coronavirus 2 (SARS-CoV2)
- Initially reported in Wuhan, China in December 2019
- Declared COVID-19 a pandemic on March 11th, 2020 by WHO.
- Kenya's first case announced March 13th, in a returning traveler.
- Currently:

Transmission of SARS-CoV-2

- Primarily through respiratory droplets - directly through contact with an infected person or indirectly through fomites.
  *Procedures with aerosol transmission



Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations

Scientific brief
29 March 2020

World Health Organization

This version updates the 27 March publication by providing definitions of droplets by particle size and adding three relevant publications.

Modes of transmission of the COVID-19 virus

Respiratory infections can be transmitted through droplets of different sizes: when the droplet particles are >5-10 µm in diameter they are referred to as respiratory droplets, and when then are ≤5µm in diameter, they are referred to as droplet nuclei.[1] According to current evidence, COVID-19 virus is primarily transmitted between people through respiratory droplets and contact routes.[2-7] In an analysis of 75,465 COVID-19 cases in China, airborne transmission was not reported.[8]

Droplet transmission occurs when a person is in in close contact (within 1 m) with someone who has respiratory symptoms (e.g., coughing or sneezing) and is therefore at risk of having his/her mucosae (mouth and nose) or conjunctiva (eyes) exposed to potentially infective respiratory droplets. Transmission may also occur through fomites in the immediate environment around the infected person.[8] Therefore, transmission of the COVID-19 virus can occur by direct contact with infected people and indirect contact with surfaces in the immediate environment or with objects used on the infected person (e.g., stethoscope or thermometer).

Research Letter

ONLINE FIRST FREE

March 4, 2020

Air, Surface Environmental, and Personal Protective Equipment Contamination by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) From a Symptomatic Patient

Sean Wei Xiang Ong, MBBS[1]; Yian Kim Tan, PhD[2]; Po Ying Chia, MBBS[1]; et al

» Author Affiliations | Article Information

JAMA. Published online March 4, 2020. doi:10.1001/jama.2020.3227

- Should we be concerned about blood safety during a respiratory disease outbreak?

World Health Organization (March 2020) *Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations: Scientific brief*
Ong SW et al. (March 2020) *Air, surface environmental, and personal protective equipment* JAMA

ID Outbreaks and Blood Transfusion Services

- Provision of safe and adequate blood is integral to clinical service

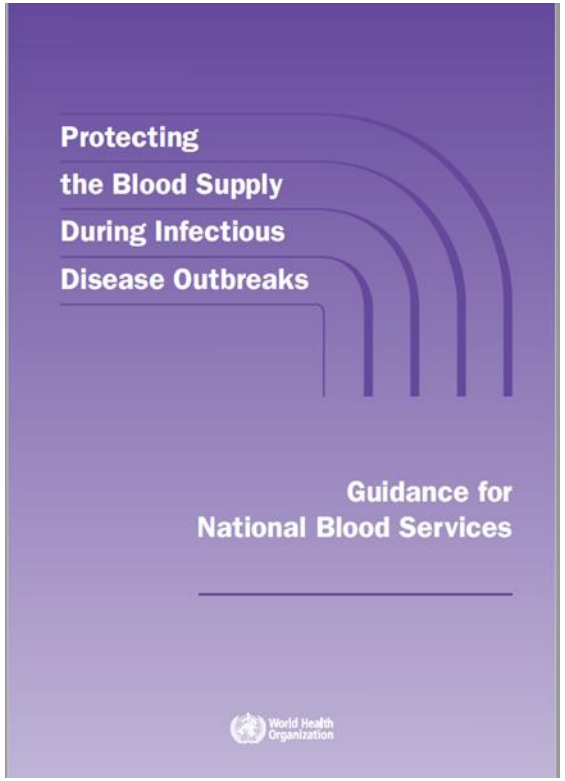
13. BLOOD PRODUCTS of HUMAN ORIGIN and PLASMA SUBSTITUTES				
13.1 Blood and Blood Components				
13.1.1	Plasma, fresh-frozen			4
13.1.2	Platelets			4
13.1.3	Red blood cells			4
13.1.4	Whole blood			4
13.2 Plasma-derived Medicines				
13.2.1 Human immunoglobulins				
13.2.1.1	Anti-D immunoglobulin[293]	PFI + diluent	750 IU/mL (2mL vial)	4
13.2.1.2	Anti-Hepatitis B immunoglobulin (HBIG)[294]	Injection	100 IU/mL	4
13.2.1.3	Anti-Rabies immunoglobulin[295]	Injection	200 IU/mL (5mL vial)	2

[291] Deferasirox oral form may be an alternative, depending on cost and availability
[292] Paediatric strength not commercially available. For extemporaneous preparation using Hydroxyurea powder
[293] Rh_0 (human monoclonal). Contains 1,500IU = 300 micrograms per 2mL vial when reconstituted
[294] Use for sexual assault survivors and children born to Hepatitis B+ mother
[295] Ig (Equine)

MOH (2019) *Kenya Essential Medicines List 2019*

ID Outbreaks and Blood Transfusion Services

- Questions relevant to the COVID-19 pandemic and blood safety include donor susceptibility, viraemia and transfusion transmissibility



World Health Organization (2019) *Protecting the blood supply during infectious disease outbreaks: guidance for national blood services*. Geneva: World Health Organization. Licence: CC BY-NC-SA 3.0 IGO.

Assessment of impact of an infectious agent on a blood transfusion service

- ‘Is this a recognized human infection?’
- ‘Is this a zoonosis or is there zoonotic potential?’
- ‘Is the donor population susceptible?’
- ‘Is the infectious agent endemic OR, for zoonoses or vector-borne diseases, is the animal host or vector present?’
- ‘Are there routes by which donors may be exposed?’
- ‘Will exposed donors donate?’
- ‘Is there a risk to sufficiency rather than a risk of transmission?’
- ‘Are there existing effective donor selection or processing measures in place to identify such donors or remove or inactivate the infectious agent?’

Assessment of impact of an infectious agent on a blood transfusion service

Is SARS-CoV-2 a human pathogen?

YES

nature microbiology

Consensus Statement | Open Access | Published: 02 March 2020

The species *Severe acute respiratory syndrome-related coronavirus*: classifying 2019-nCoV and naming it SARS-CoV-2

Coronaviridae Study Group of the International Committee on Taxonomy of Viruses

Nature Microbiology **5**, 536–544(2020) | Cite this article

Assessment of impact of an infectious agent on a blood transfusion service

Is SARS-CoV-2 a human pathogen?

- Over 2.4 million cases confirmed globally, with 163,000 deaths
- Locally- 296 cases, 14 deaths

Assessment of impact of an infectious agent on a blood transfusion service

Is the Kenyan blood donor population susceptible?

YES

Assessment of impact of an infectious agent on a blood transfusion service

Is the Kenyan blood donor population susceptible?

- SARS-CoV-2 is a highly infectious disease
- emerging, no evidence of herd immunity
- no vaccine
- all ages
- some cases fit donor criteria
- nothing to suggest so far that the donor population is immune

Assessment of impact of an infectious agent on a blood transfusion service

Are there routes by which Kenyan blood donors may be exposed?

YES

Assessment of impact of an infectious agent on a blood transfusion service

Are there routes by which Kenyan blood donors may be exposed?

- Transmission by respiratory droplets, fomites
- Initial risk factor was travel
- Local transmission is rising

Assessment of impact of an infectious agent on a blood transfusion service

Will exposed donors donate?

MAYBE

Assessment of impact of an infectious agent on a blood transfusion service

Will exposed donors donate?

- ✓ Donors are susceptible
- Can an infected donor qualify to donate?

Will exposed donors donate blood?

- Donors are self-declared well
- With COVID-19, is there a time period where an individual may be infected but feeling well?

Potential Presymptomatic Transmission of SARS-CoV-2, Zhejiang Province, China, 2020.

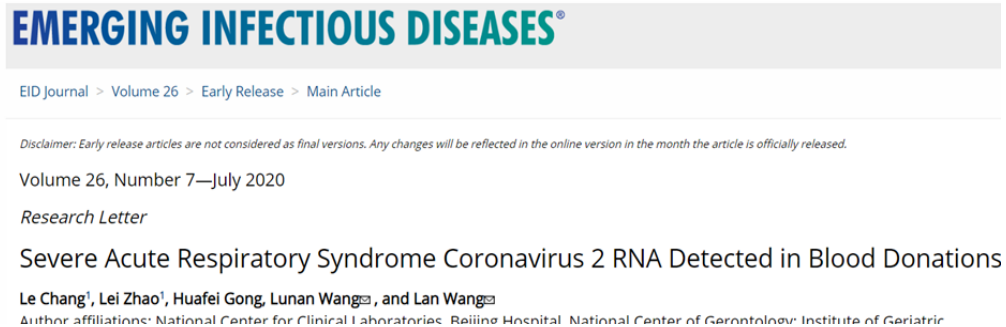
Tong ZD, Tang A, Li KF, Li P, Wang HL, Yi JP, Zhang YL, Yan JB

Emerging Infectious Diseases, 17 May 2020, 26(5):1052-1054
DOI: 10.3201/eid2605.200198 PMID: 32091386

Wei WE, et al. (January 23–March 16, 2020) Presymptomatic Transmission of SARS-CoV-2 — Singapore,. MMWR Morb Mortal Wkly Rep 2020;69:411–415
Z.-D. Tong et al Potential Presymptomatic Transmission of SARS-CoV-2, Zhejiang Province, China, 2020. Emerg. Infect. Dis. 26, (2020).
Y. Bai et al, Presumed Asymptomatic Carrier Transmission of COVID-19. JAMA 10.1001/jama.2020.2565 (2020). doi:10.1001/jama.2020.2565pmid:32083643
Ferretti L , et al Quantifying SARS-CoV-2 transmission suggests epidemic control with digital contact tracing. Science. March 2020:eabb6936.

Will exposed donors donate blood?

- With COVID-19, is there a time period where an individual may be viraemic but feeling well?



EMERGING INFECTIOUS DISEASES®

EID Journal > Volume 26 > Early Release > Main Article

Disclaimer: Early release articles are not considered as final versions. Any changes will be reflected in the online version in the month the article is officially released.

Volume 26, Number 7—July 2020

Research Letter

Severe Acute Respiratory Syndrome Coronavirus 2 RNA Detected in Blood Donations

Le Chang[1], Lei Zhao[1], Huafei Gong, Lunan Wang, and Lan Wang

VoxSanguinis

ISBT International Society of Blood Transfusion

The International Journal of Transfusion Medicine

Commentary | Free Access

Post-donation COVID-19 identification in blood donors

So-Yong Kwon, Eun-Jin Kim, Yu Soek Jung, Jin Sung Jang, Nam-Sun Cho

First published:02 April 2020 | https://doi.org/10.1111/vox.12925

- 4 donations tested positive in Wuhan, 2 asymptomatic and 2 presymptomatic
- 7 donors tested positive in the Korean Red Cross Blood Services (KRCBS) after donation

Wei WE, et al. (January 23–March 16, 2020) Presymptomatic Transmission of SARS-CoV-2 — Singapore,. MMWR Morb Mortal Wkly Rep 2020;69:411–415
Z.-D. Tong et al Potential Presymptomatic Transmission of SARS-CoV-2, Zhejiang Province, China, 2020. Emerg. Infect. Dis. 26, (2020).
Chang L, Zhao L, Gong H, Wang Lunan, Wang L. Severe acute respiratory syndrome coronavirus 2 RNA detected in blood donations. Emerg Infect Dis. 2020 Jul
Kwon SY, Kim EJ, Jung YS, Jang JS, Cho NS. Post-donation COVID-19 identification of blood donors. Vox Sang 2020

Assessment of impact of an infectious agent on a blood transfusion service

Will exposed donors donate?

YES

Assessment of impact of an infectious agent on a blood transfusion service

Are there existing effective donor selection or processing measures to identify donors or remove or inactivate SARS-COV-2 in this situation?

?

Are there existing effective donor selection or processing measures to identify donors or remove or inactivate SARS-COV-2 in this situation?

Donor Specific

- Donor recruitment
- No donor specific questions that assess risk of COVID-19
- Donor assessment e.g. temp check?

Chang L, Zhao L, Gong H, Wang Lunan, Wang L. Severe acute respiratory syndrome coronavirus 2 RNA detected in blood donations. Emerg Infect Dis. 2020 Jul
Kwon SY, Kim EJ, Jung YS, Jang JS, Cho NS. Post-donation COVID-19 identification of blood donors. Vox Sang 2020

Are there existing effective donor selection or processing measures to identify donors or remove or inactivate SARS-COV-2 in this situation?

Agent Specific

- Current TTI screen: Not screening for SARS-CoV-2.
- Processing: e.g. component prep, leucoreduction, storage
- Pathogen reduction/inactivation technology

Chang L, Zhao L, Gong H, Wang Lunan, Wang L. Severe acute respiratory syndrome coronavirus 2 RNA detected in blood donations. Emerg Infect Dis. 2020 Jul
Kwon SY, Kim EJ, Jung YS, Jang JS, Cho NS. Post-donation COVID-19 identification of blood donors. Vox Sang 2020

Assessment of impact of an infectious agent on a blood transfusion service

Are there existing effective donor selection or processing measures to identify donors or remove or inactivate SARS-COV-2 in this situation?

NO

Potential risk to safety and/or sufficiency of donated products.

Full risk assessment is recommended

Risk assessment of SARS-CoV-2 to Blood Safety (and Supply*)

- Epidemiology, pathogenicity, transmission in general public, **transfusion transmission/transmissibility**
- Efficacy of donor & donation screening
- Steps to prevent, remove, inactivate pathogen
- Impact on recipients

Transfusion Transmission of SARS-CoV-2

- Identified/detected viraemia in donated blood and blood components.
- Detection of virus does not mean virus is infectious.
- No confirmed cases as yet.


Contents lists available at ScienceDirect

Transfusion Medicine Reviews

journal homepage: https://www.journals.elsevier.com/transfusion-medicine-reviews/

Coronavirus Disease 2019: Coronaviruses and Blood Safety

Le Chang [a,b], Ying Yan [a,b], Lunan Wang [a,b,c,*]

- **Transfusion transmission of SARS-CoV2 is considered a theoretical risk**

Risk assessment of SARS-CoV-2 to Blood Safety

- Epidemiology, pathogenicity, transmission in general public, transfusion transmission
- Efficacy of donor & donation screening
- Steps to prevent, remove, inactivate
- Transfusion transmissibility
- Impact on recipients

COVID-19 and Blood Safety: Risk Assessment

Consequence	Risk of infectious agent entering the blood supply				
	Rare	Unlikely	Possible	Likely	Almost certain
Transmission highly unlikely	Low	Low	Low	Moderate	Moderate
Transmission could occur, but no associated clinical consequences in most cases	Low	Low	Moderate	Moderate	High
Transmission with minimal clinical consequences and no long-term sequelae in most cases	Low	Moderate	High	High	High
Transmission with morbidity and possibility of death or disability	Moderate	High	Extreme	Extreme	Extreme
Transmission with significant morbidity and high risk of death or disability	High	High	Extreme	Extreme	Extreme

COVID-19 and Blood Safety: Risk Assessment

Consequence	Risk of infectious agent entering the blood supply				
	Rare	Unlikely	Possible	Likely	Almost certain
Transmission highly unlikely	Low	Low	Low	Moderate	Moderate
Transmission could occur, but no associated clinical consequences in most cases	Low	Low	Moderate	Moderate	High
Transmission with minimal clinical consequences and no long-term sequelae in most cases	Low	Moderate	High	High	High
Transmission with morbidity and possibility of death or disability	Moderate	High	Extreme	Extreme	Extreme
Transmission with significant morbidity and high risk of death or disability	High	High	Extreme	Extreme	Extreme

COVID-19 and Blood Safety: Risk Assessment

Consequence	Risk of infectious agent entering the blood supply				
	Rare	Unlikely	Possible	Likely	Almost certain
Transmission highly unlikely	Low	Low	Low	Moderate	Moderate
Transmission could occur, but no associated clinical consequences in most cases	Low	Low	Moderate	Moderate	High
Transmission with minimal clinical consequences and no long-term sequelae in most cases	Low	Moderate	High	High	High
Transmission with morbidity and possibility of death or disability	Moderate	High	Extreme	Extreme	Extreme
Transmission with significant morbidity and high risk of death or disability	High	High	Extreme	Extreme	Extreme

COVID-19 and Blood Safety: Risk to Recipient

Consequence	Risk of infectious agent entering the blood supply				
	Rare	Unlikely	Possible	Likely	Almost certain
Transmission highly unlikely	Low	Low	Low	Moderate	Moderate
Transmission could occur, but no associated clinical consequences in most cases	Low	Low	Moderate	Moderate	High
Transmission with minimal clinical consequences and no long-term sequelae in most cases	Low	Moderate	High	High	High
Transmission with morbidity and possibility of death or disability	Moderate	High	Extreme	Extreme	Extreme
Transmission with significant morbidity and high risk of death or disability	High	High	Extreme	Extreme	Extreme

Suggested measures to mitigate risk of COVID-19 to blood safety

Donor Recruitment

- Recruitment of VNRBD, convert replacement to VNRBD
- Recruit donors from ‘safe’ areas

Suggested measures to mitigate risk of COVID-19 to blood safety

Donor Selection

- Include in questionnaire prior to donation when making appointment
  - History of travel within the past 28 days
  - History of cough, fever, (COVID-19 case def)
  - History of contact with COVID-19 patient
- Donor health assessment should include a temperature check prior to entering blood collection venues.

Suggested measures to mitigate risk of COVID-19 to blood safety

Donor deferral

- 28 day deferral for prospective donors with history of travel outside the country
- Deferral of prospective donors with contact history of a confirmed or suspected case
- Donor with fever or respiratory symptoms

Suggested measures to mitigate risk of COVID-19 to blood safety

Blood collection

- Standard operating procedures apply
- Ideally divert first 20-50ml with skin plug
- With cough etiquette- disposable tourniquets or disinfect plastic tourniquets

Suggested measures to mitigate risk of COVID-19 to blood safety

Post-donation

- Encourage donors to report any symptoms 28 days post donation
- If symptoms reported- quarantine/recall product
- Check in with donors at day 14?
- Haemovigilance measures- cough and fever post transfusion?

COVID-19 and Blood Safety-2

- Blood insufficiency and impact on blood safety- through less than ideal donor selection.
- Reagent insufficiency and impact on blood safety
- Staff shortage

Acknowledgments