

# COVID-19 Pandemic – blood supply challenges and approaches in AATM member countries

Nabajyoti Choudhury,<sup>1</sup> Ankit Mathur,<sup>2</sup> Cees Th Smit Sibinga<sup>3</sup>  & On behalf of AATM

<sup>1</sup>Health City Hospital, Khanapara, India

<sup>2</sup>Transfusion Medicine, Rotary Bangalore TTK Blood Bank, Bangalore Medical Services Trust, Bengaluru, India

<sup>3</sup>IQM Consulting, Zuidhorn, Netherlands

## Abstract

With the COVID-19 outbreak, AATM took an early initiative to provide the membership instructive recommendations and informative aide mémoire. Optimizing membership support a survey was sent to 25 pandemic affected member countries, to collect challenges and approaches on blood supply and transfusion.

**Approach** Survey sent to AATM country representatives. Five questions focused on in-country blood collection and pandemic situation, diagnosis, treatment and personal protection equipment (PPE), including a snapshot question on disease magnitude; and 2 descriptive questions on challenges and responses to overcome challenges. Country classification – 2018 UNDP statistical update Human Development Indices/Indicators (HDI). Basic metric statistics.

**Results** Response rate: 92%; HDI classification: Low – 1; Medium – 9; High – 9 and Very High – 4 countries; population range: 540 544–1 380 000 000; blood collection/1000: 2.4–36.1. Ranges/1000: hospital beds, intensive care/isolation beds and ventilators respectively: 0.5–8.2; 0.019–1.8; 0.0007–1.11. All countries had quarantine facilities. Sufficient PPE: all but three countries. Testing facilities: all but three countries. All but one country listed challenges and responses. Most common challenges and approaches were, respectively, shortages in blood donors and supply (19/22), staff safety (13/22); and mass media education and awareness campaigns (21/22), staff education on safety practices and universal precautions (18/22).

**Conclusion** High response from Medium and High HDI countries. Major challenges reported: effects of pandemic on blood donors and blood supply, where most countries already were suffering from shortages due to their development state. Key approaches: staff education to prevent infection; focused public awareness campaigns to convince donors to keep coming to support the nation's blood availability during crisis.

**Key words:** AATM, approaches, blood supply, challenges, COVID-19 pandemic, transfusion medicine.

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## Correspondence:

Cees Th Smit Sibinga, IQM Consulting, Zuidhorn, Netherlands  
E-mail: c.sibinga@planet.nl

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## Introduction

The Asian Association of Transfusion Medicine (AATM) was founded in 1999 and is registered as a formal professional association in New Delhi, India [1]. The AATM attracts members from 46 countries and has currently over 1000 individual members in 20 member countries

and 5 associate member countries (Balkan region, Europe). As a young but alert association, it is concerned with the professional competencies of its members and their countries relevant to transfusion medicine vein-to-vein, and has developed a wide range of active and operational educational programs [2]. In 2018, AATM was awarded the American Association of Blood Banks (AABB) President's Award in recognition of its commitment to improving donor and patient safety, promoting transfusion medicine research and working with the AABB to advance international partnerships [3].

With the global outbreak of COVID-19, even before it reached the WHO status of pandemic, the association took an early initiative (17 March 2020) to provide the entire membership with an instructive guideline and recommendations on how to handle the daily blood supply and consumption operations to prevent unnecessary spread of the SARS-CoV-2 virus [4]. This was rapidly followed (21 March 2020) by an informative aide mémoire with a checklist that spread over the World and was well received for its comprehensiveness [5, 6].

To be able to optimize the support of the membership during this pandemic and beyond, a simple survey was sent out (13 April 2020) to 25 countries (20 members and 5 associate members) affected by the COVID-19 pandemic, to collect the various challenges and innovative responses of the membership (countries) caused by the COVID-19 pandemic on the blood supply and transfusion practices. Much was learned from the experiences of the member country China, where the Chinese Society of Blood Transfusion already had drafted 'Recommendations for Blood Establishments Regarding the Novel Coronavirus Disease (COVID-2019) Outbreak' (v1.0) [7] and the draft WHO document circulating [8].

## Approach

A survey with seven questions was designed and sent on 13 April 2020 to 25 AATM country representatives, 20 member countries (Afghanistan, Bangladesh, Bhutan, Cambodia, Hong Kong, India, Iran, Kyrgyzstan, Maldives, Mongolia, Morocco, Oman, Pakistan, Palestine, Russian Federation, Saudi Arabia, Serbia, Sri Lanka, Timor Leste and Turkey) and 5 associate member countries (Albania, Bosnia&Herzegovina, Montenegro, North Macedonia, and Serbia) in the Balkan region in Europe. The questionnaire was accompanied by an explanatory letter asking for a voluntary participation. Five questions were focused on the in-country blood collection and pandemic situation, available diagnostics, treatment and personal protection equipment (PPE) resources, including a snapshot question on the magnitude of the disease, and two descriptive questions on the challenges and approaches to overcome

the challenges, to be shared for learning and improvement (Table 1).

Countries were classified according to the 2018 UNDP statistical update of Human Development Indices and Indicators (HDI) [9]. Basic metric statistics (proportions, percentages, ranges, averages) were applied. The date of distribution of the survey 13 April 2020 was used as the reference date. COVID-19 data were retrieved from the WHO daily Coronavirus Disease (COVID-2019) Situation Reports [10].

## Results

Of the 25 countries approached, 24 responded. The response of one of them could not be used because of insufficient information. Therefore, 23/25 (92%) of the responses could be analysed. HDI classification of these countries (Table 2) was: Low HDI – 1 (0.496); Medium HDI – 9 (0.686–0.562); High HDI – 9 (0.798–0.717) and Very High HDI – 4 (0.853–0.814) countries, with a population range of 540 544 (Maldives) to 1 380 000 000 (India).

These 23 countries were located in four WHO regions (Table 2). The five Balkan Region countries (associate AATM members) belong to the WHO European region.

## Characteristics

Annual blood collection range per 1000 population was 2.4 (Afghanistan) to 36.1 (Turkey). Per 1000 population, the ranges for hospital beds, intensive care/isolation beds and ventilators were, respectively, 0.5 (Afghanistan) to 8.2 (Russian Federation); 0.019 (Timor Leste) to 1.8 (Bhutan); and 0.0007 (Bangladesh) to 1.11 (Mongolia). All responding countries had quarantine facilities available. Sufficient PPE was available in all but three countries (Afghanistan, Sri Lanka and Timor Leste). Testing facilities (confirmative) were reported available in all but three countries (Bangladesh, Maldives and Bosnia & Herzegovina). All but one country (Timor Leste) listed challenges and innovative responses (approaches).

All responding countries have actively introduced the AATM guidelines [4] and aide mémoire [5, 6] in their daily vein-to-vein transfusion practices.

## Challenges and innovative approaches

The responses to the question on what challenges were experienced in this COVID-19 pandemic situation in maintaining adequate and safe blood and blood product supplies for the right patient in the right quantity and at the right time (Table 3) were categorized in 6 groups – 1. Reduced/shortage blood donors and supply; 2. Shortage

**Table 1** Survey questions

(1) Name of country and population
(2) Annual blood collection (approximately)
(3) Magnitude of pandemic situation
3.1 COVID-19-positive cases
3.2 Suspected patients hospitalized
3.3 Number of deaths
(4) Resources available (approximately)
4.1 Total hospital general beds
4.2 Total hospital isolation beds
4.3 Total hospitals having ventilator facility
4.4 Quarantine facility – yes/no
4.5 PPE in sufficient quantity – yes/no
(5) Testing facility in the country – yes/no (if available give number)
(6) What are your challenges in COVID-19 pandemic situation in maintaining safe blood supply to the right patient in the right quantity and the right time (please write in bullet points)?
(7) Innovation applied to overcome challenges and what others can learn?

of competent staff; 3. Safety of staff, donors and public; 4. Logistics of test kits and consumables; 5. Communication and transportation (donors, blood and blood products); and 6. Convalescent plasma.

For the approaches to overcome these challenges, each of these 6 categories was coded into one or more actions, 18 total as shown in Table 3, S3a and S3b (1-1 to 1-6; 2-1, 2-2; 3-1 to 3-3; 4-1 to 4-3; 5-1 to 5-3; and 6-1).

### Challenges

The most common challenges reported (Table 3) were shortages in blood donors and supply (19/22), safety of staff, donors and public (15/22), logistics of test kits and consumables (9/22), communication and transport (8/22) and convalescent plasma (6/22). Afghanistan, belonging to the low HDI category, and highly depending on

external aid, reported very basic challenges – an increased lack of consumables, equipment and financial resources. Of the 9 medium HDI countries, 8 explained the challenges experienced. Only Timor Leste did not describe what challenges were experienced. These all belong to the Western Pacific (1), South-East Asian (4), Eastern Mediterranean (3) and European (1) Regions and all but Morocco (COVID-19 incidence 45/million and death rate 3-20/million) were at the reference date (13 April 2020) in the onset of the pandemic. The 9 high HDI responding countries belong to Western Pacific (1), South-East Asian (3) and European (5) Regions. The European Region countries all were rapidly developing COVID-19 incidence and related mortality ranging respectively from 1-54 to 859-55/million and 0-00 to 3-65/million. Four of these countries (all with a higher incidence and deaths rate) were already involved in convalescent plasma collection, preservation and transfusion. Of the four very high HDI countries two (Sultanate Oman and Saudi Arabia) belong to the Eastern Mediterranean Region and the other two (Montenegro and Russian Federation) to the European Region. Shortage of staff was not really a problem (3/22) where care of safety through prevention of infection (hygiene, PPE, distancing) certainly was reported as a major challenge (15/22).

### Innovative approaches

The most common innovative approaches and responsive actions reported (Table 3) did follow the major challenge categories 1, 3, 4, 5 and 6, were for category 1 use of social media (12/22), mass media education and awareness campaigns (20/22), and postponing elective surgical interventions; for category 3 a shift in team work (10/22) and education of staff on safety practices and universal precautions (18/22); for category 4 the attention was

**Table 2** Participating countries (n = 23) per HDI and WHO Region

HDI (index)	Western Pacific	South-East Asia	Eastern Mediterranean	Europe	Total
Low (0-496)			Afghanistan		1
Medium (0-686–0-562)	Cambodia	Bangladesh Bhutan India Timor Leste	Morocco Pakistan otPalestine	Kyrgyzstan	9
High (0-798–0-717)	Mongolia	Maldives Sri Lanka	Iran	Albania Bosnia and Herzegovina North Macedonia Serbia Turkey	9
Very High (0-853–0-814)			Oman Saudi Arabia	Montenegro Russian Federation	4
Total	2	6	7	8	23

**Table 3** a. Question 6: Categories of challenges in maintaining safe blood supply and b. Question 7: codes of innovative approaches to overcome challenges per HDI group of countries; Low HDI = 1; Medium HDI = 9; High HDI = 9; Very High HDI = 4

	Low HDI	Medium HDI	High HDI	Very High HDI	Total
a. Q6 - categories of challenges					
1. Shortage of blood supply and donor	1/1	6/9	9/9	3/4	19/23
2. Shortage of competent staff	0	2/9	1/9	0	3/23
3. Safety of staff, donors and public	0	6/9	6/9	2/4	15/23
4. Logistics of test kits and consumables	1/1	4/9	2/9	2/4	9/23
5. Communication and transportation	0	4/9	4/9	1/4	8/23
6. Convalescent plasma	0	2/9	4/9	0	6/23
b. Q7 - codes of innovative approaches					
1.1 Social media campaigns	1/1	4/9	5/9	2/4	12/23
1.2 Mass media education and awareness	1/1	8/9	8/9	3/4	20/23
1.3 Home visit for blood donation (motivation)	0	0	1/9	1/4	2/23
1.4 Postpone elective surgical interventions	0	2/9	4/9	3/4	9/23
1.5 Patient blood management (PBM)	0	0	3/9	0	3/23
1.6 Mobile phone app-based appointment for donation	0	1/9	0	1/4	2/23
2.1 Focus on urgent and emergency work	0	3/9	2/9	0	5/23
2.2 Call for help	0	0	0	0	0
3.1 Shift team work	0	4/9	5/9	1/4	10/23
3.2 Education of staff: universal precautions, safety, hand washing/hygiene, disinfection	0	8/9	8/9	2/4	18/23
3.3 Donor management and education: social distance, masks, triage	0	4/9	2/9	2/4	8/23
4.1 More vendors to be evaluated	1/1	2/9	0	1/4	4/23
4.2 Local vendors preferred	1/1	1/9	0	0	2/23
4.3 Emergency resource planning and Management	0	1/9	1/9	1/4	4/23
5.1 Motivation of donors and clarification of doubts and fear	0	5/9	5/9	1/4	11/23
5.2 Government support to provide Guidelines	0	1/9	1/9	2/4	4/23
5.3 Donor permits for movement (for blood donation)	0	2/9	0	1/4	3/23
6.1 Convalescent plasma project initiated (MoH) as clinical trial	0	2/9	4/9	0	6/23

focused on reducing risks of shortages by having more consumable vendors, and creating an emergency resource planning and management; category 5 showed a change in approaching the donor community through motivation and clarification of growing fears and doubts on safety. Category 6 on convalescent plasma collection and use showed a growing interest in national initiatives and guidelines for the collection, preservation and clinical trials when using immunotherapy with hyperimmune plasma (6/20). The higher the prevalence of SARS-CoV-2 infection (morbidity and mortality), the stronger the need to prevent interruption of the blood supply, although in the countries with relatively mild pandemic manifestations, prevention and safety while continuing the blood supply were dominant.

### Blood supply

In all responding countries, the Ministry of Health is actively supporting the blood establishments in the motivation of potential donors to overcome resistance and prejudices, mobilization and transport of potential blood

donors. Several countries reported observed reasons for reduced blood collections both actively and passively. Bhutan noticed fear for infection, Albania reported problems in communication with potential donors, but also like Bangladesh a reduction in the daily routine surgical interventions. In Saudi Arabia, Albania and Kyrgyzstan potential donors were approached at home to convince them to continue and make an appointment for medical selection and blood donation. The Russian Federation and Kyrgyzstan provide a taxi ride or other free transportation to and from the blood establishment to facilitate donors to come and contribute. Several countries (e.g. Albania, Bosnia & Herzegovina, Bhutan, Maldives) have already in an early stage introduced triage upon reception of potential donors. However, ministerial messages urging people to stay home and observe the lockdown also has resulted in confusion and the interpretation that one should not go out for blood donation. A number of countries, for example Albania, Iran, India, Montenegro and North Macedonia, have introduced the use of social media to call donors individually for a personal appointment, spreading the risk for crowding at certain hours with an

increase of contamination and infection of donors and staff. A major challenge reported by over 60% of the countries is in keeping up mobile team donation sessions while observing social distancing and prevention of spread through physical contact. Some countries report at the time of the survey a lack of consumables, equipment and PPE tools as an important challenge (e.g. Afghanistan, Bangladesh, Cambodia, otPalestine, Mongolia, Sri Lanka Timor Leste) largely caused by closed borders and interruption of supplying air traffic. Some of the shortages were not complete and could be solved within a couple of weeks, despite the existing economic sanctions and limitations (e.g. Iran). Mongolia and Saudi Arabia have introduced a policy to purchase long expiry reagents and critical consumables.

Despite the lockdown, running projects and those in the pipeline for the collection and production of convalescent plasma are continuing with the support of the Ministries of Health. This was reported by Morocco, India, Serbia, the Maldives and North Macedonia. The convalescent plasma program that took off in Iran was implemented. However, the regular plasma fractionation program is seriously hindered by the closed borders, because their plasma cannot be shipped at the moment to the contracted fractionator.

All reporting countries so far seem to be able to meet within acceptable limits their clinical demands, particularly for thalassemia and haemophilia care in Iran and Bangladesh, although shortages are about to develop. Major attention through social and mass media is given to communication with the public and potential donors, as well as with personnel to sustain the motivation and provide focused information and knowledge on how to behave professionally without increasing the risk of infection – personal and operational hygiene, cleanliness, disinfection, tidiness and discipline.

### COVID-19 situation

The COVID-19 situation at the date of the electronic distribution (13 April 2020) of the survey, and a month later (May 13, 2020, writing of manuscript) are represented in Table 4. Countries are arranged per WHO Region. The data show a major overall increase in confirmed COVID-19 cases ( $\Delta$ ) of 9.3 for the South-East Asian Region countries,  $\Delta = 4.9$  for the European Region countries,  $\Delta = 2.4$  for the Eastern Mediterranean countries and  $\Delta = 1.2$  for the two Western Pacific countries. It is not clear why there was no increase documented for Cambodia, where all other responding countries showed a smaller [ $n = 21$ ;  $\Delta 0$  (Cambodia) – 9.6 (Saudi Arabia)] or bigger [ $n = 4$ ;  $\Delta 12.0$  (Timor Leste) – 45.2 (Maldives)] increase in COVID-19-confirmed cases and related death. Per million

**Table 4** COVID-19 situation (confirmed cases and deaths) per country

WHO Region/country	13-04-2020		13-05-2020	
	Total confirmed	Total deaths	Total confirmed	Total deaths
Western Pacific				
Cambodia	122	0	122	0
Mongolia	16	0	42	0
South-East Asia				
Bangladesh	621	34	16 660	250
Bhutan	5	0	11	0
India	9152	308	74 281	2415
Maldives	20	0	904	3
Sri Lanka	210	7	889	9
Timor Leste	2	0	24	0
Eastern Mediterranean				
Afghanistan	607	19	4967	127
Iran	71 686	4474	110 767	6733
Morocco	1661	118	6418	188
Oman	727	4	4019	17
Pakistan	5374	93	34 261	737
otPalestine	271	2	547	4
Saudi Arabia	4462	59	42 925	264
European				
Albania	446	23	876	31
Bosnia and Herzegovina	1007	38	2162	116
Kyrgyzstan	419	5	1044	12
Montenegro	267	2	324	9
North Macedonia	828	34	1674	92
Russian Federation	18 328	858	242 271	2212
Serbia	3630	80	10 243	220
Turkey	56 956	1,198	141 475	3894

Countries are arranged per HDI category. Dates: 13 April start survey, 13 May 2020 one month later showing where and to what extent the crisis progresses.

population, there are striking differences between the Regions. Similarly, the number of COVID-19 deaths increased with the exception of Cambodia, Mongolia, Bhutan and Timor Leste. The increase ranged from  $\Delta 0.00$  (Cambodia, Mongolia, Bhutan and Timor Leste) to  $\Delta 7.84$  (India). The country and regional average confirmed COVID-19-infected cases and related deaths are provided in Table 5. Western Pacific Region ( $n = 2$ ) shows, respectively, at the reference date an average of 6.10 and 0.00 per million population; South-East Asia Region ( $n = 6$ ) 10.00 and 0.13 per million population; Eastern Mediterranean Region ( $n = 7$ ) 181.82 and 1.52 per million population; and European Region ( $n = 8$ ) 322.61 and 8.67 per million population. The average for the South-East Asian Region confirmed COVID-19-infected cases are heavily skewed by the cases in Iran (859.55 and 3.65, respectively). However, the highest death toll was in North Macedonia with 17 per million followed by Turkey with



**Table 5** Population and COVID-19 information (per million population).

WHO Region/country	Population	COVID-19/ million	Deaths/ million
13 April 2020			
Western Pacific			
Cambodia	16 820 918	7.26	0.00
Mongolia	3 238 479	4.94	0.00
		Average 6.10	Average 0.00
South-East Asia			
Bangladesh	161 750 000	3.84	0.21
Bhutan	771 608	6.49	0.00
India	1 380 000 000	6.63	0.22
Maldives	540 544	36.99	0.00
Sri Lanka	21 000 000	10.00	0.33
Timor Leste	1 300 000	1.54	0.00
		Average 10.90	Average 0.13
Eastern Mediterranean			
Afghanistan	31 600 000	19.27	0.60
Iran	83 399 189	859.55	3.65
Morocco	36 910 560	45.00	3.20
Oman	5 106 626	142.38	0.78
Pakistan	212 200 000	25.23	0.44
otPalestine	5 101 414	53.13	0.39
Saudi Arabia	34 810 000	128.18	1.60
		Average 181.82	Average 1.52
European			
Albania	2 862 427	155.84	8.04
Bosnia and Herzegovina	3 500 000	287.71	10.86
Kyrgyzstan	6 316 000	66.34	0.79
Montenegro	620 029	430.65	3.23
North Macedonia	2 000 000	414.00	17.00
Russian Federation	146 700 000	124.94	5.85
Serbia	8 737 371	415.47	9.16
Turkey	83 000 000	686.22	14.43
		Average 322.61	Average 8.67

Countries arranged per WHO Region. Date: 13 April 2020 (reference).

14.43 and Bosnia & Herzegovina with 10.86 deaths per million population, all three in the European Region. There is a definite trend noticeable from East to West in both the average number of COVID-19 reported and confirmed cases and the number of COVID-19 deaths per million population ranging from, respectively, 6.10 (Western Pacific), 10.19 (South-East Asian), 128.28 (Eastern Mediterranean) to 322.61 (European) cases and 0.00 (Western Pacific), 0.13 (South-East Asian), 1.52 (Eastern Mediterranean), to 8.67 (European) COVID-19 deaths per million population. When looking at the numbers of deaths per million population divided into three groups of 0.00–1.00, 1.00–10.00 and 10.00–50.00, there were at the reference date of 13 April 2020.

-First group: 13 countries (Western Pacific Region – Cambodia 0.00; Mongolia 0.00; South-East Asian Region –

Bangladesh 0.21; Bhutan 0.00; India 0.22; Maldives 0.00; Sri Lanka 0.33, Timor Leste 0.00; Eastern Mediterranean Region – Afghanistan 0.60; Oman 0.78; Pakistan 0.44; otPalestine 0.39; and European Region – Kyrgyzstan 0.79);

-Second group: 7 countries (Eastern Mediterranean Region – Saudi Arabia 1.60; Morocco 3.20; Iran 3.65; and European Region – Montenegro 3.23; Russian Federation 5.85; Albania 8.04 and Serbia 9.36);

-Third group: 3 countries (European Region – Bosnia and Herzegovina 10.86; Turkey 14.43; North Macedonia 17.00). It is less likely that the consistency in lower numbers spread over the regions is solely or even largely due to lack of tests or incomplete records in the respective countries. However, it may have played a role in those countries with poor economics and related state of operations of their healthcare and blood transfusion systems.

## Discussion

With the outbreak of COVID-19 end 2019 in the province of Wuhan, China, and the tsunamic spread over the world developing into a pandemic, WHO supported by the US-CDC in Atlanta, Georgia, called for joined efforts to contain the spread and mitigate the effects of the virus SARS-CoV-2 on human lives and societies [11]. The Director-General Dr. Tedros Adhanom Ghebreyesus explicitly warned that 'the greatest enemy right now is not the virus itself, but fear, rumours and stigma. The greatest assets are facts, reason and solidarity'. The public measures and interventions advocated and instituted by governments caused a complete change of life affecting dramatically economy, culture, professional and social life.

The necessary limitation in public movement and the lockdown rapidly affected many infrastructural elements in society, including the daily blood supply of hospitals for those in need whether elective in surgery, obstetrics or oncology, or supportive in aplastic anaemia, hemoglobinopathies and bleeding disorders. To minimise the risks of infecting healthy people, blood donors and healthcare workers, guidelines were introduced first by the Chinese Society of Blood Transfusion [7], WHO [8] and the Asia Pacific Blood Network (APBN) which provided an overview of expected challenges and risks to blood safety [12].

## AATM response

The AATM, early March 2020, took the initiative to provide the membership a simple two-page clear instructive guideline and an equally simple two-page explanatory aide mémoire with a practical checklist to follow which

was distributed widely to a colourful pallet of individuals, organizations and institutes all over the world. In response, a movement started to develop at national and international level appropriate guidelines and recommendations to safeguard the blood supply and transfusion practices (e.g. Iran, India, Montenegro, AABB, World Federation of Hemophilia, Thalassaemia International Federation).

In order to support and stimulate the AATM membership, a simple survey was organized to find out the challenges and innovative approaches to cope with the country situation. The responses paint a picture of the realities existing and the creativity to prevent a forced collapse of the operational blood supply and hospital services.

The data collected on the magnitude of the pandemic per country reveal an interesting epidemiological picture when looking at the member countries. Not only the UNDP state of development as expressed by the human development index (HDI) categories, but also the UN/WHO Regions they belong to provide an informative picture of the state of the art in blood transfusion. The majority of member countries classify as medium ( $n = 9$ ) or high ( $n = 9$ ) HDI with an awakening development of the healthcare and integrated blood transfusion system. Some countries reported to experience a complete isolation (e.g. Bhutan, Iran and Mongolia) due to closing borders and air traffic, causing serious shortage in consumables, reagents and pharmaceuticals. Iran, the member country most dramatically hit by COVID-19, additionally suffers from economic sanctions which prohibit sending their convalescent plasma to the contract fractionator for further pharmaceutical processing.

As of the reference date of the survey, 13 April 2020, the COVID-19 picture shows a remarkable increase in manifestation and magnitude of COVID-19 from East [Western Pacific ( $n = 2$ ) and South-East Asia ( $n = 6$ ) Regions] to West [Eastern Mediterranean ( $n = 7$ ) and Europe ( $n = 8$ ) Regions]. The higher the HDI classification the more cases and related deaths per million population were observed.

Hospitals were overwhelmed with seriously ill COVID-19-infected patients who needed intensive care and occupied a large proportion of the available healthcare workers and capacity. A prevalent challenge is the rapidly developed shortage in blood supply due to less potential donors attending blood collection sessions and travel restrictions. Most mobile team sessions and camps closed down, staff observed the lockdown and stayed home. The fact that in a number of the member countries regular voluntary and non-remunerated blood donation is still in its infancy and the blood supply is depending largely on family/replacement and one-time-only donations,

contributes noticeably to the increased shortages. Countries responded changing the approach of the public and their registered donors, implementing a more personal approach through social media and even house visits to make personal appointments for medical selection and blood donation. Some countries (e.g. Russian Federation, Albania, Kyrgyzstan, Saudi Arabia) offer free transport to the blood establishment and back. To prevent initial symptomatic potential donors to enter the blood centre, triage has been instituted in Bhutan, Bosnia and Herzegovina, Iran and the Maldives. Although in most situations hospitals are still supplied adequately, elective surgical interventions have been reduced or postponed and patient blood management is further developing [13, 14].

So far there is no evidence of transmission of SARS-CoV-2 through blood transfusion although there are reports on the presence of viral RNA post-donation in asymptomatic donors [15, 16].

### Blessing in disguise?

The landslide in behaviour, culture and professional awareness and attitudes caused by the pandemic in fact is a blessing in disguise. Shortcomings and gaps are clearly, bluntly and shameless disclosed triggering action at all levels. The effect on global and regional programs such as the Sustainable Development Goals [17], Universal Health Coverage [18] and the implementation of Essential Medicines [19, 20], *in vitro* Diagnostics [21] and Medical Devices [22], besides the WHO Eastern Mediterranean Strategic framework for blood safety and availability 2016–2025 [23] and WHO Action framework to advance universal access to safe, effective and quality-assured blood products [24] uncovers the so far latent and disinterested behaviours of political and professional leadership in health care and blood transfusion.

Will COVID-19 turn the tide more progressively to the benefit of safety and availability of blood transfusion?

### Conclusion

The survey resulted in a high response (92%) from largely Medium and High HDI countries (18/23) from four WHO Regions. The major challenges reported were the effects of the pandemic on blood donors and the blood supply causing shortages, where most of these countries already were suffering from shortages due to their state of development and poor economics. Key approaches reported were education of staff to boost motivation and prevent infection of the human resource, and focused public awareness campaigns with the intention to convince

potential donors to keep coming to donate and support the nation's blood availability during the crisis.

It seems that the pandemic is acting as a blessing in disguise stimulating more conscious and alert awareness and developments of transfusion medicine that so far were not really attended with much political and professional interest and commitment.

Will COVID-19 turn the tide more progressively and effectively?

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## Conflict of interest

The authors have nothing to declare.

## Ethics consideration

The AATM survey and the data to collect do not need ethical approval.

## References

- 1 Asian Association of Transfusion Medicine. Accessible at <https://aatmweb.org/>.
- 2 Present Activities. Accessible at <https://aatmweb.org/#>
- 3 AABB 2018 President's awards. *2018 AABB Annual Meeting Program Guide*. Bethesda: AABB 2018:26
- 4 AATM recommendations (guidelines) to prevent COVID-19 infection through the blood supply. Accessible (pdf) at [https://aatmweb.org/wp-content/uploads/2020/03/AATM\\_Guidelines\\_COVID-19\\_BTS.pdf](https://aatmweb.org/wp-content/uploads/2020/03/AATM_Guidelines_COVID-19_BTS.pdf).
- 5 Aide Mémoire COVID-19. Accessible (pdf) at [https://aatmweb.org/wp-content/themes/custom\\_theme/coronaa.pdf](https://aatmweb.org/wp-content/themes/custom_theme/coronaa.pdf)
- 6 Aide Mémoire COVID-19. *Global J Transfus Med* 2020; 5:7-8
- 7 Chinese Society of Blood Transfusion: Recommendations for Blood Establishments Regarding the Novel coronavirus Disease (COVID-2019) Outbreak (v1.0). Accessible (pdf) at <https://eng.csbt.org.cn/portal/article/index/id/606/cid/7.html>.
- 8 World Health Organization: Maintaining a safe and adequate blood supply during the pandemic outbreak of coronavirus disease (COVID-19). Available from: [https://www.who.int/publications-detail/maintaining-a-safe-and-adequate-blood-supply-during-the-pandemic-outbreak-of-coronavirus-disease-\(covid19\)](https://www.who.int/publications-detail/maintaining-a-safe-and-adequate-blood-supply-during-the-pandemic-outbreak-of-coronavirus-disease-(covid19)).
- 9 UNDP 2018: 2018 Statistical Update: Human Development Indices and Indicators. New York. Accessible (pdf) at <http://hdr.undp.org/en/content/human-development-indices-indicators-2018>
- 10 WHO Coronavirus disease (COVID-2019) situation reports: Accessible (pdf) at <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>.
- 11 WHO director-general's opening remarks at the media briefing on COVID-19: Accessible (pdf) at <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19--28-february-2020>.
- 12 APBN Rapid Brief White Paper: *Novel Coronavirus (SARS-CoV-2)*. Expected challenges and risks to blood safety, 2019. Accessible (pdf) at <https://apbnonline.com/images/apbn%20rapid%20brief%20white%20paper%202019%20novel%20coronavirus%20sars-cov-2.pdf>
- 13 Shander A, Gooble SM, Warner MA, *et al.*: Essential role of patient blood management in a pandemic: A call for action. *Anesth Analg* 2020; 131:74–85. <https://doi.org/10.1213/ANE.0000000000004844>. (in press)
- 14 SABM position: Patient Blood Management during the COVID-19 Pandemic. Accessible (pdf) at <https://sabm.org/publications/>.
- 15 Chang L, Zhao L, Gong H, *et al.* Severe acute respiratory coronavirus 2 RNA detected in blood donations. *Emerg Infect Dis* 2020; first published online April 03, 2020. <https://doi.org/10.3201/eid2607.200839>.



- 16 Kwon S-Y, Kim E-J, Jung YS, *et al.* Post-donation COVID-19 identification in blood donors. *Vox Sang* 2020; first published online April 02, 2020. <http://onlinelibrary.wiley.com/doi/10.1111/vox.12925>
- 17 Sustainable Development Goals. New York: United Nations; 2015. Available (pdf) from: <https://sustainabledevelopment.un.org/?menu=1300>.
- 18 WHO Universal Health Coverage, accessible (pdf) at [http://www.who.int/universal\\_health\\_coverage/en/](http://www.who.int/universal_health_coverage/en/)
- 19 WHO Model List of Essential Medicines, 18th edition Geneva, CH. 2013. Accessible (pdf) at [http://www.who.int/medicines/publications/essentialmedicines/18th\\_EML.pdf](http://www.who.int/medicines/publications/essentialmedicines/18th_EML.pdf)
- 20 WHO Expert Committee on Biological Standardization. Sixty-seventh report. Guideline for the management of blood and blood components as essential medicines. WHO Technical Report Series 1004. Geneva, CH. Annex 3. 2017, Accessible (pdf) at [http://www.who.int/biologicals/WHO\\_TRS\\_1004\\_web.pdf](http://www.who.int/biologicals/WHO_TRS_1004_web.pdf).
- 21 WHO Model List on Essential in-vitro Diagnostics, 1st edition, Geneva, CH. 2018. Accessible (pdf) at [http://www.who.int/medical\\_devices/diagnostics/WHO\\_EDL\\_2018.pdf](http://www.who.int/medical_devices/diagnostics/WHO_EDL_2018.pdf)
- 22 WHO Medical Devices, accessible (pdf) at [https://www.who.int/medical\\_devices/priority/3\\_6.pdf?ua=1](https://www.who.int/medical_devices/priority/3_6.pdf?ua=1).
- 23 WHO EMRO regional strategic framework for blood safety and availability 2016-2025. Accessible (pdf) at [http://applications.emro.who.int/dsaf/EMROPub\\_2017\\_EN\\_19608.pdf?ua=1](http://applications.emro.who.int/dsaf/EMROPub_2017_EN_19608.pdf?ua=1)
- 24 WHO Action framework to advance universal access to safe, effective and quality-assured blood products 2020-2023. Accessible (pdf) at <https://www.who.int/news-room/detail/19-02-2020-who-action-framework-to-advance-universal-access-to-safe-effective-and-quality-assured-blood-products-2020--2023>.

## Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

**Table S3a** Question 6 – What are your challenges in COVID-19 pandemic in maintaining safe blood supply to the right patient in the right quantity and right time.

**Table S3b** Question 7 – innovation applied to overcome challenges and what others can learn.