




# Vox Sanguinis International Forum on Hospital Transfusion Services' Response to COVID-19: Responses

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Naomi Rahimi-Levene & Victoria Peer

## Israel

### Question 1

Demographics:

- Beer Yaakov, Israel.
- Large academic medical centre.
- 956 beds.
- 9034 RBC units issued in 2019, approximately 9000.
- 4831 confirmed SARS-CoV-2 cases and 17 deaths (31 March 2020, 12:40 pm, data from the Israeli Ministry of Health).
- 9 136 000 inhabitants.
- The spread of SARS-CoV-2 in Israel is still increasing, but as of yesterday the rate of increase is declining sharply (from almost 30% of samples tested per day at the peak to 12% yesterday).

### Question 2

Our hospital blood bank accepts samples for pre-transfusion testing from patients who were confirmed or suspected to be infected with novel coronavirus.

- Yes.
- There are changes that affect the safety of the people dealing with the samples.
  - The samples are labelled as suspected to be infected with COVID-19, and they arrive in biohazard packages. They are supposed to be delivered only by a messenger (not via pneumatic tubes).
  - The samples are opened in a Biological Safety Cabinet (BSC), tested there and then accepted in to blood bank's electronic system.
  - The samples are tested in a Thermo Class II, Type A2 BSC, which was acquired for the blood bank because of the COVID-19 epidemic.

- Personal protective clothing includes 2 sets of gloves, goggles, an N95 filtering mask and a disposable gown worn over the laboratory cloth gown the worker routinely wears.
  - Samples are stored on a separate shelf in a sealed container marker biohazard.
  - Samples are disposed via biohazard wastage.
- The policies stated in the previous answer were changed only for suspected and confirmed COVID-19 patients.
- Before we acquired our own BSC, the policy was as follows:
    - If urgent tests cannot be performed, O-positive RBCs and AB plasma issued.
    - To examine the records, if present, in the electronic blood bank system.
    - If known antibody, antigen-negative RBCs to be issued.

### Question 3

We do not release products for an individual patient in a cooler.

### Question 4

We have a plan to deal with samples with novel pathogens, which was implemented during the 2003 SARS epidemic.

### Question 5

Instruction was mandatory for all laboratory personnel explaining the infectivity of the virus and how to use personal protective clothing when handling a suspected or confirmed sample. They were also instructed on how to work in the BSC, where to store the samples and how to dispose of the waste.

**Question 6**

The utilization of blood components has not changed since the start of the epidemic. But since elective surgical procedures have been postponed due to the epidemic, we expect our usage to go down.

**Question 7**

No, we do not expect shortages in our hospital, as the national blood service Magen David Adom does not have shortages at this stage. However, if the situation in the country changes and the national blood services will have a shortage in donors, we will be affected by this as they are our only supplier.

**Question 8**

It is important to have both a national and a local policy for dealing with infected samples, and the staff must be familiar with all aspects of it. It is important to have a national entity that can answer questions arising during the pandemic, as unexpected scenarios may occur. Communication between the blood supplier and the hospital blood banks is cardinal. Especially as there are already look-back issues of donors either in quarantine or infected, whose donated units have already been issued. Locally, in the laboratory it is important to have a plan dividing the staff into shifts that rotate and do not have contact with other in order to avoid neutralizing the whole team if an individual is infected.

**Question 9**

Magen David Adom, the national blood service, is beginning to collect convalescent plasma from COVID-19 patients tomorrow. The plan is to collect 600 ml for each convalescent. Pathogen reduction will be performed either by the Intercept® Blood System or by the Mirasol® Pathogen Reduction Technology System. The decision is being made at this time. There will be a national policy to whom it will be transfused (Personal Communication, Prof. Eilat Shinar, Director of Magen David Adom National Blood Services).

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**Spain****Question 1**

Demographics:

- (a) Madrid, Spain.
- (b) Tertiary hospital, including solid and haematopoietic transplants and complex surgeries.
- (c) 578 beds before COVID-19; 869 last Tuesday 31 March 2020.
- (d) 13 167 last 2019 year.
- (e) Today; 4 April 2020: 117 710 confirmed cases; 10 935 confirmed deaths.
- (f) 46-45 million inhabitants.
- (g) Decreasing in new cases, increasing in intensive care and deaths.

**Question 2**

Yes, our hospital blood bank accepts samples for pre-transfusion testing from patients who were confirmed or suspected to be infected with novel coronavirus.

- (h) Yes, changes have been made.
- (i) All samples (tubes) received at the blood bank underwent a hypochlorite swabbing. Also, routine samples received underwent an UV light treatment for around 30 min.
- (iv) No, just gloves, as usual.
- (v) As usual, after the UV light treatment.
- (vi) As usual, biosafe containers.
- (j) All pre-transfusion samples and routine samples (DAT, m ABO typing and antibody screening).
- (k) Not applicable.

**Question 3**

At our hospital, we are assuming that all the patients and workers are actually infected. We have improved the infection risks (hypochlorite, hand washing, alcoholic dilutions...but for every sample and everybody).

**Question 4**

Yes, I think so, but nobody had read it before, I guess.

**Question 5**

Yes, definitely. All workers have been trained according to their risk assessment.

**Question 6**

It has been dramatically reduced. Our transfusion activity has been reduced to just urgent transfusion.

We have begun today a clinical trial to transfuse convalescent plasma from recovered patients/donors to mild-severe new patients. Actually, the first randomized patient has received today a plasma transfusion. We think this new strategy will increase our transfusion activity in the next weeks.

**Question 7**

No, we do not anticipate blood component shortages. At the beginning of the epidemic in Madrid, we expected a shortage, and we implemented different strategies, but at the end it was not necessary, as lot of donors came during the first days to donate. This, beside the blood component reduction due to routine surgery suspension, took to a reduced need of blood components.

**Question 8**

Be ready to implement a quick and efficient convalescent plasma programme.

**Question 9**

Yes, our centre will offer convalescent plasma. Please see our plasma manufacturing protocols in Annex 1. Information on the clinical trial may be obtained by writing directly to the corresponding author.

*Annexe 1: Manufacture of pathogen reduced plasma from healthy donors (pr-hp) and pathogen reduced plasma from convalescent COVID-19 donors (pr-cp)*

*Pathogen reduced plasma from convalescent covid-19 donors manufacture*

**Convalescent donors (cd) selection.** Convalescent donors will be recruited according to the inclusion and

exclusion criteria included in the protocol of this clinical trial. (See protocol).

Briefly, convalescent donors are cured patients after the COVID-19 infection. To verify their cure, a double-negative RNA RT-PCT (with at least 24 h interval) and a specific antibodies against SARS-CoV-2 will be performed.

Also, these donors will fulfil the requirements to be accepted as a general altruistic blood donor, as is defined in the European Guidelines [1] and the Spanish RD 1088/2005.

**Convalescent donors (cd) recruitment.** CD will be contacted by phone using the regional or national COVID-19 patient's database. CD candidates will be asked to participate in this trial and will be pre-screened according to the previous inclusion and exclusion criteria. If agree, CD will be appointed to the apheresis collection centre, for:

- (a) Whole information about the trial's objectives and apheresis risk.
- (b) A full screening interview.
- (c) Standard microbiological test for blood donors (HBsAg, anti-HCV, anti-HBV, lues serology and HCV-PCR) and SARS-CoV-2 specific determinations: double RT-PCR (with at least 24-h interval) and qualitative antibodies determination. (Only documented SARS-CoV-2 antibodies documented will be accepted).
- (d) Arranging an appointment for the plasmapheresis collection, when test is okay according to the inclusion criteria.

**Convalescent donors (cd) plasmapheresis collection.**

- (1) The collection day, CD will be again screened as an altruistic plasmapheresis donors, performed a finger haemoglobin test, blood pressure and cardiac rate.
- (2) A single identification number (SIN) according to ISBT128 codification will be assigned to each plasmapheresis donation.
- (3) CD will undergo an apheresis process using a Trima machine (Terumo BCT) and a single-use apheresis kit to obtain 600 ml of leucodepleted plasma ( $<1 \times 10^6$  leucocytes per bag).

Note: Any apheresis machines and kits able to collect the defined product would be also acceptable.

- (4) CD will receive a 500 ml saline infusion through the inline apheresis vein access, after the plasma collection. This is advisable, but not mandatory.
- (5) Product collected will be kept until 8 h (including the inactivation process) at room temperature (20°C) or frozen, if more than 8 h, before underwent the inactivation process.

- (6) The 600 ml collection will be separated into two bags containing 300 ml, to be further inactivated.
- (7) If plasma has been previously frozen, it will be thawed, inactivated and refrozen before 2 h.
- (8) The inactivation process will be done using the Mirasol system (Terumo BCT), according to the Mirasol Process Guide for treatment of plasma (see Annex 2).

Note: Any other plasma inactivation system validated for transfusion products could also be acceptable. (Consider, e.g. Methylene Blue or Amotosalen procedures).

- (9) All the plasma transfusion between different bags will be done using a close system [2] and preferably using a sterile tubing welder, as the TSCDII device (Terumo BCT).
- (10) Inactivated 300 ml bags will be labelled using the primary SIN number followed by a subset code (*a* and *b*).
- (11) Inactivated 300 ml bags will be frozen below  $-25^{\circ}\text{C}$  and stored following European guidelines for blood components storage [1] (36 months below  $-25^{\circ}\text{C}$  or 3 months below  $-18^{\circ}\text{C}$ ).

Plasmapheresis data, donor tests and labelling will be done using the *software Coyote*, or any other software designed for managing blood components.

#### *Pathogen reduced plasma from healthy donors (pr-hp) manufacture*

PR-HP used in this study is the same product used for the plasma transfusion indications in the clinical practice. These products are collected and manufactured by the Regional Blood Transfusion Centers in Spain and are distributed to hospital transfusion services for their use.

The properties, preparation, quality requirements, storage and transport requirements, labelling requirements and warnings for the manufacturing of these products are well described in the chapter 2 of the *Guide to the preparation, use and quality assurance of blood components. 18th ed.* [1]. For an easy consultation of those requirements, we have added this chapter as an annex. at the end of this document.

PR-CP is also prepared according to the same requirements; however, two main differences between both plasma products are referred:

- PR-CP will be only collected using an apheresis, while PR-HP is produced mainly from the separation of whole blood collections.
- PR-CP will be collected and manufactured in some hospital blood transfusion services, while PR-HP will come from Regional Transfusion Centers. Later, Blood Transfusion Center will be recruited also as PR-CP production centres.

The investigators of this trial do not consider these differences between the two plasma products to be critical, and regarding objectives of this trial both products can be considered as equivalent on the manufacture procedure, being the only critical difference the presence of high titre of neutralizing anti SARS-CoV-2 antibodies, in contrast to the plasma coming from healthy donors.

#### References

- 1 European Committee on Blood transfusion: *Guide to the preparation, use and quality assurance of blood components.* 18th ed. EDQM, editor. Strasbourg, France: Council of Europe. 2015
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## United States

### Question 1

Demographics:

- (a) Stanford, California, United States of America.
- (b) Large academic medical centre.
- (c) Stanford Healthcare (SHC), adult hospital: 605 beds; Lucile Packard Children's Hospital (LPCH): 364 beds.
- (d) 41 000.
- (e) 386 817 cases and 10 686 deaths [3].
- (f) 332 639 102, (July 2020 est.) [4].
- (g) Increasing [3].

### Question 2

Yes, we accept samples for pre-transfusion testing.

- (h) No, we did not change our policies or procedures.
- (i) N/A.
- (j) No, we did not change our testing policies or procedures.
- (k) N/A.

**Question 3**

- (l) No change to standard policy. The RBC units are loaded into the cooler but not in separate bags.
- (m) Yes, by alcohol wipes.
- (n) Disinfected, also by alcohol wipes.
- (o) Disinfection of cooler and RBC units is a special precaution because of novel coronavirus.

**Question 4**

Yes. Under our standard operating protocols, universal precautions apply to all specimen handling. There is, however, no specific detail regarding novel pathogens. Our protocols refer transfusion laboratory staff to follow the SHC Lab administration policies and procedures as well. Therefore, our policy for how to handle PUI blood specimens and our COVID-19 response in general were shaped by guidance provided by the SHC Lab Quality programme. At each occurrence or encounter of a future novel pathogen, we will look to the SHC and Lab Quality/Safety leadership for guidance.

**Question 5**

Yes. During operational staff huddles, the SHC and SHC Lab published guidelines were discussed. SHC Lab Quality also assigned lessons (i.e. readings with required quizzes and signatures at completion) to all AP and Clin Lab staff. All Transfusion Service staff, supervisors and manager were included in these trainings.

**Question 6**

Overall blood usage has decreased by about 30% since the start of the pandemic.

**Question 7**

- (p) Yes in the medium term. Our plan has been primarily to reinforce good transfusion practices within the hospital. The following memo was sent to clinical staff to clarify our recommendations:

‘With a continued risk to blood product supply, we ask for your quick review of and adherence to transfusion and care guidelines below.

The use of restrictive transfusion practices has been shown to be equivalent or better for patient care in many scenarios and should always be practised. During this time of uncertainty, it is imperative to use transfusion judiciously.

**RBC transfusions:**

- (1) Send type and screen and blood type verification sample in a timely manner (on new patients) to ensure that type-specific blood can be issued and O-neg universal inventory preserved for emergencies.
- (2) Transfuse symptomatic patients only when hemoglobin <7 g/dl. A higher threshold of 8 g/dl should be considered only for patients with significant coronary artery disease [5].
- (3) Review daily lab testing and minimize #/frequency of draws to only those that will impact clinical decision making.

Platelet transfusions: transfusions should be considered for counts below the following thresholds:

- (1) <10 k for non-bleeding patients, without planned procedure [6].
- (2) <20 k for low-risk procedures such as line placements, paracentesis, thoracentesis and lumbar punctures [6].
- (3) <50 k for bleeding patients or prior to most surgeries. Plt <math>\leq 50</math> k should be reserved for neurosurgical procedures [6].
- (4) For procedures requiring transfusion, it should be started alongside the procedure or immediately before to mitigate consumption and sequestration.
- (5) Antifibrinolytic agents such as aminocaproic acid and tranexamic acid should be considered to help control bleeding.
- (6) Cardiopulmonary bypass patients with bleeding should get TEG testing to guide the need for specific product therapy instead of empiric transfusion of multiple products.

Plasma transfusions: avoid prophylactic therapy based on INR prior to procedures.

Meta-analysis finds that patients with INR  $\leq 2.0$  do not have higher bleeding risk compared to normal range INR across a wide variety of minor and major procedures [7].

Consultation with transfusion medicine (Pager #12027 staffed 24/7) and haematology (SHC: p#27436 SCH/LPCH #24362) is encouraged with any blood product questions, especially on patients with platelet refractoriness or bleeding.’

**Question 8**

The Transfusion Service/Blood Bank remains a ‘little different’ and therefore ‘unique’ from the rest of laboratory operations within the hospital as biological blood products, besides blood specimens, are handled in our setting. During



the COVID-19 pandemic, the first version of the Laboratory 'One-Point Lesson (OPL) regarding specimen handling' for our institution did not quite cover the manual serology of blood specimens, which remains a common practice even during this era of automation, and other blood product manipulations (e.g. modification methods such as separation, aliquoting and washing). In the absence of strong guidance from the CDC, this led to some uncertainty, and personnel became concerned about safety. We were able to abate these concerns and ensure safety through a process of self-assessment, adaptation of some best practices from other institutions and, ultimately, implementation of further guidelines from the CDC. In sum, we think a thorough, independent assessment of the Transfusion Service, Blood Bank and blood collection centre as to the physical environment, methods of specimen or blood product processing, and equipment in use should be initiated early in preparation for 'safe handling' guidance to be issued as quickly as possible to working personnel.

### Question 9

We are currently planning to use convalescent plasma from COVID-19 patients in a trial and for compassionate use. The dosing scheme is still being worked out, but eligible patients are expected to get one unit of plasma. Patient eligibility will be determined per FDA IND criteria [8]. We plan to exclude patients who are eligible for any other active trials at Stanford (currently, this will mostly pertain to patients who are eligible for remdesivir). Due to practical considerations, we will not seek pathogen inactivation of the plasma at this time.

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## Brazil

### Question 1

Demographics:

- Rio de Janeiro, Brazil.
- Academic Medical Center.
- 100 (exclusively for haematological patients).
- 12 064.
- Cases: 23 830; Deaths: 1355 (As of 04.14.2020).
- 209 500 000.
- Definitely, still increasing.

### Question 2

Yes.

- No. We consider that any sample can come from a COVID-19 case, even though the patient is asymptomatic.
- As indicated below:
  - No change.
  - No change for accepting the samples. To open the tubes, the operators are using a plastic film between their hands and the tube caps.
  - With all the other samples.
  - Face shield + surgery masks for all our laboratory personnel + gloves + laboratory coats.
  - No change.
  - No change. Closed tubes are discarded in as appropriate container, which is sealed and sent to incineration outside our premises by a subcontractor company.
  - The only change was the way we are opening the tubes, and it applies to all the samples.
  - Not applicable.

*Question 3*

- (l) Since we have a centralized transfusion team in charge of all transfusions, we just dispatch one bag at a time. So, no change in the standard policy.
- (m) Yes.
- (n) Disinfected.
- (o) Cooler disinfection after every return was not performed. We introduced this cleaning procedure because of the pandemic. And it will be part of our regular procedures.

*Question 4*

No, we did not have this specific preparedness plan. Now we are developing a comprehensive plan to encompass those situations.

*Question 5*

Yes. Everyday there is a training session, with a limited number of attendees.

*Question 6*

Red blood cell concentrates' utilization was reduced by 21-20% since the start of the pandemic in Rio de Janeiro. Platelet utilization is stable; plasma utilization was reduced by 24%.

It should be stressed that we only treat patients with primary haematological diseases (leukaemia, lymphoma, myeloma, sickle cell disease, etc.). The reduction in red blood cell and plasma utilization was due to the fact that many outpatients are missing their medical appointments, even if they were scheduled to be transfused. This is especially true for sickle patients in a chronic transfusion programme.

Platelets are almost exclusively transfused for inpatients, that is why platelet utilization rate is stable during the pandemic.

*Question 7*

YES, we anticipate component shortages.

- (p) Yes in the medium term.

Our hospital is part of a complex which includes the main blood centre in Rio de Janeiro city. Since it is very hard to reduce or adapt blood utilization in patients with severe haematological diseases, we concentrated our efforts on alternative strategies to donor recruitment during the pandemic. Namely, replacing mobile drive in universities, companies and churches (all of them closed) by

mobile drives in the armed forces locals and in the large private condominiums. More than 1000 people live in each one of these condominiums, and the vast majority are staying at home due to the lockdown recommendation.

For our fixed site, we are stimulating blood donation under appointment, in order to comply with social distance measures.

Regarding the blood utilization side, the only difference was a more restrictive transfusion policy for sickle cell patients. If we had a blood shortage, we could opt for simple transfusion instead of partial exchange transfusion in some situations (but so far we did not have a blood shortage).

*Question 8*

The main difficulty is related to our workforce. A large proportion is ill or have had close contact with a confirmed case. In addition, public transport is restricted and our employees face many problems in leaving their homes.

A reduction in the number of workers able to go to the hospital was taken into account in our contingency plan. However, the mitigating measures that we established were not sufficient, due to the magnitude of the pandemic and to the number of health professionals directly affected by COVID-19.

The lessons we learned about this are that we need to update the plan daily and adapt our activities to the availability of employees—for example suspending the activity of the centralized transfusion team.

*Question 9*

Yes, we are collecting it for use in other hospitals to where we refer COVID-19 patients. We are selecting donors with an anti-SARS-CoV-2 IgG titre  $\geq 80$ ; these donors must also have a neutralizing antibody titre  $\geq 1:64$ . The plasma dose is 200–300 ml/patient (a single transfusion). We accept female donors; if they have already become pregnant, we screen their plasma for anti-HLA antibodies. For plasma donors O and A, we are also performing an anti-A (and anti-B, for O plasma) agglutinin titration.

We are inactivating pathogens with Amotosalen + UVA irradiation technology (Cerus technology).

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## Denmark

### Question 1

Demographics:

- (a) Odense, Denmark.
- (b) Tertiary care hospital (university hospital).
- (c) Approx. 1000.
- (d) 41 000.
- (e) 6876 (confirmed cases), 309 (deaths) as of 15 April 2020.
- (f) 5 823 000.
- (g) Decreasing.

### Question 2

Yes, we accept all samples for pre-transfusion testing, etc.

- (h) No change. All samples received in the laboratory are routinely handled as if contaminated. Samples from patients with known COVID-19 are cleaned externally by the phlebotomist before being forwarded to the laboratory according to hospital COVID-19 policy.
- (i) Not applicable, as we did not make changes in those areas.
- (j) We did not change testing policies.
- (k) Not applicable.

### Question 3

We do not release products for an individual patient in a cooler.

- (l) The blood bank is located within the hospital; hence, we do not use coolers for the blood products.

(m) Not applicable.

(n) Returned RBC units were handled as per usual operating procedures. If they had been outside the blood bank for more than 30 min, they were discarded.

(o) They reflect our normal practice.

### Question 4

As far as we know, it does not, except contingency plans in case of sudden emergencies with patients contaminated with radiation, chemicals or biological agents.

### Question 5

A hospital-wide mandatory e-learning programme concerning proper hand washing and other protective measures was introduced by hospital management. First-line medical staff underwent further hands-on training regarding the use of protective equipment, face masks, etc.

### Question 6

Utilization of RBC: 3 weeks (16th March – 5th April 2020): –28%

Utilization of platelets: 3 weeks (16th March – 5th April 2020): –17%

Utilization of plasma: 3 weeks (16th March – 5th April 2020): –44%

### Question 7

No, we do not anticipate blood component shortages.

### Question 8

No, we do not have any further comments.

### Question 9

Yes, patients will receive intravenous infusion with 2 × 300 ml convalescent anti-SARS-CoV-2 plasma. Both units are to be administered within a 24-h period. Units will not be pathogen inactivated.

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## Australia

### Question 1

Demographics:

- (a) Melbourne, Australia.
- (b) Large multi-site academic medical centre in metropolitan Melbourne.
- (c) 1639 across 5 hospital sites, including an on-site private hospital.
- (d) 22 190 (adult and paediatric red cell units transfused in 2019).
- (e) 6553 cases, 67 deaths.
- (f) 25 648 000.
- (g) Decreasing.

### Question 2

Yes, samples were accepted.

- (h) No, as our protocol states that there is little evidence that SARS-CoV-2 causes significant viraemia, and therefore blood for routine pathology using automated instruments and analysers is expected to be safe to process using standard laboratory biohazard precautions.
- (i) Not applicable as we did not make changes in those areas.
- (j) Not applicable as we did not change testing policies or procedures.
- (k) Not applicable.

### Question 3

If a cooler of blood products is ordered, our practices are described below.

- (l) Only a single unit is routinely issued at one time and will be issued in a plastic bag. If multiple red cell units are required, they are packed in a cooler in separate plastic bags. The cooler is left outside the room – one red cell unit at a time in a plastic bag is removed and taken into the room.
- (m) No, because the cooler is not taken into the room with the COVID-19 patient.
- (n) Returned red cell units are not accepted. These are discarded as clinical waste if they were removed from the cooler and taken into the room but not infused into the patient.
- (o) Red cell units are normally accepted back in coolers. These special precautions are the same as is current practice for barrier nursing with either 'Tier 1 Droplet and Contact precautions' or 'Tier 2 Airborne and Contact precautions'.

### Question 4

Yes.

### Question 5

The current novel pathogen method was reviewed and a separate additional protocol was written for COVID-19. This was distributed to all laboratory staff as part of COVID-19 preparations. Laboratory disinfection protocols and the correct use of PPE were reviewed with laboratory staff. The laboratory staff are required to maintain social distancing, and laboratory workplaces have been modified to implement this. However, this is intended to stop the virus from spreading between staff members, rather than protecting laboratory workers from infection from COVID-19-containing samples.

### Question 6

No change to date.

### Question 7

Yes, shortages are anticipated as indicated below.

- (p) Yes in the medium term.

The hospital has already cancelled elective surgery as part of the state level and national level response. Locally, we are enforcing single unit red cell transfusions in anaemic, haemodynamically stable non-bleeding patients who

do not have an underlying haematological or oncological hypoproliferative disorder. If blood component shortages do occur in the future, our institutional emergency blood management protocol will be activated. This involves notification of the Hospital Incident Commander and Haematology Registrar/Haematologist for clinical input and triaging of product requests for transfusions. Australia also has a National Blood Supply Contingency Plan (available at: <https://www.blood.gov.au/nbscp>) with which we will comply if it is activated. This outlines responsibilities and actions to be taken by governments, the national blood service, hospitals and laboratories.

### Question 8

Organizing our staff in a way to maintain separate teams that do not interact to minimize potential spread of the virus amongst staff and the number of contacts that would need to be isolated if a staff member becomes infected has been a challenge. This is difficult in our 24/7 open-plan laboratories where the Blood Bank, Haematology, Biochemistry and Specimen Reception staff all share a large work space. Social distancing, correct use of PPE and frequent disinfection of work benches have been implemented. We have changed our work practice so that interactions between staff are via written messages or video conferencing whenever possible.

### Question 9

Convalescent plasma from COVID-19 patients is not yet available in our jurisdiction. We are developing protocols for its use within clinical trials, and have been participating in dialogue regarding trial design and product specifications through the ISBT Clinical Practice Working Party and our national and international research networks. Our national blood supplier is investigating the feasibility of providing this product.

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Vincenzo de Angelis Et Michela Delle Donne

## Italy

### Question 1

Demographics:

- (a) Udine, Italy.
- (b) Academic Medical Center (Udine University Hospital 'S. Maria della Misericordia').
- (c) 865 (+115 Day Hospital).
- (d) 16 580 in 2019.
- (e) 181 228 confirmed cases, 24 214 associated deaths (MoH data).
- (f) 60 000 000.
- (g) Just starting to decrease.

### Question 2

Yes, samples were accepted.

- (h) Yes, changes were made.
- (i) The changes are described below.
  - (i) It is required that labelling of the sample (as well as compilation of request form) is performed outside the patient's room, in a 'safe area'.
  - (ii) Wearing gloves is always mandatory in the laboratory; staff is requested to change gloves whenever handling samples from SARS-CoV-2 (confirmed or suspected) coming from any clinical ward; paper transfusion requests are stored for 5 days in sealed bags before archiving.
  - (iii) With all the other samples, since most of the testing is done in automated or semi-automated machines.

- (iv) When handling samples and requests, protective visor (splash guard) or glasses are routine universal precautions; surgical mask if known samples from COVID-19 patients.
- (v) Sealed tube on dedicated rack in the same refrigerator where other samples are stored.
- (vi) Routine universal precautions with other samples.
- (j) Some added precautions when samples come from known or suspected SARS-CoV-2 infected patients (e.g. use of the surgical mask).
- (k) Not applicable.

### Question 3

Coolers are not used.

- (l) We do not use coolers for blood issuing (hospital blood bank) but only disposable plastic bags.
- (m) Not applicable.
- (n) Only external sanitization if returned from COVID-19 clinical wards.
- (o) Not applicable.

### Question 4

No, regular routine universal precautions are mandatory for any blood sample (potentially infectious).

### Question 5

Yes, different online courses and education provided on the website of the hospital. At a national level, a specific online education is provided by National Health Institute (Istituto Superiore di Sanità, Rome).

### Question 6

All hospitals in Italy have responded to the emergency (all ICU have been initially occupied by COVID-19 patients) by drastically reducing the non-urgent surgical and medical admittance. This was responsible for a decrease of blood utilization (25%–30% during the central weeks of March). At the beginning of March, there was also a decrease in blood donations but then a rapid increase due to a big pressure on public opinion (by national and Regional MoH, Civil Protection, Blood Donor Associations, National Health Institute. . .). This was responsible for an unwanted increase of the inventories in blood establishments.

### Question 7

Yes, we anticipate blood component shortages.

- (p) Yes in the medium term; increase of blood distribution during last week reflects the increased hospital

activity and a shortage in the forthcoming months, when hospitals will rise activities at a regular level, while many blood donors who donated in March and April will not be available.

Plan measures (e.g. scheduled donations) to allow regular/constant access of donors to the collection sites; reinforcing all actions for the control on appropriate use of blood components (PBM, restrictive transfusion triggers, early recall of untransfused units after surgery – not later than 12 h).

### Question 8

After the emergency, we need to restructure mechanisms for a better dynamism and a faster adaptation of blood collection programmes to rapid changes in the 'scenario' of blood demand, to avoid either shortage or unnecessary stocks of blood components.

### Question 9

Although this is not a programme for Udine University Hospital, many protocols using plasma from patients who recovered from COVID-19 are ongoing or planned in Italy. For reference, see the 'Position paper on the preparation of immune plasma to be used in the treatment of patients with COVID-19' published by SIMTI and SidEM available at [http://isbtweb.org/fileadmin/user\\_upload/Italy.pdf](http://isbtweb.org/fileadmin/user_upload/Italy.pdf).

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Mike Murphy & Julie Staves

## United Kingdom

### Question 1

- Demographics:
- (a) Oxford, England.

- (b) Large academic medical centre.
- (c) 1185.
- (d) 17 000.
- (e) As of 21/4/20 129 044 cases; 17 337 deaths in the UK.
- (f) 66-65 million (2019).
- (g) Stable.

**Question 2**

Yes, samples were accepted.

- (h) Yes, testing policies or procedures were changed.
- (i) The areas of change are identified below.
  - (i) No changes.
  - (ii) Yes. Sample not processed immediately after centrifugation to minimize the risk of contamination by aerosol when opening the sample container.
  - (iii) On routine analyser with other samples.
  - (iv) No changes.
  - (v) No changes.
  - (vi) No changes.
- (j) Only for COVID-19 suspected samples.
- (k) Not applicable.

**Question 3**

No changes to the usual practice were made if a cooler of blood products was ordered for a patient with confirmed or suspected COVID-19.

**Question 4**

Yes.

**Question 5**

Yes in relation to minimal changes to usual practice. Only change as described above: samples not processed immediately after centrifugation to minimize the risk of contamination by aerosol when opening the sample container.

**Question 6**

Yes. Red cell and FFP usage has reduced by about 40% because of postponement of elective work. Platelet usage is down approximately 20%.

**Question 7**

We do not anticipate any blood component shortages. The challenge for us has been to minimize wastage at a time when blood usage has reduced significantly. We have reduced our usual stock levels by about 30%.

**Question 8**

Try to maintain normal procedures to avoid confusion amongst the many hospital staff involved in some aspect of transfusion.

**Question 9**

Yes. We will be providing CCP for patients enrolled in clinical trials. Dose is 2 units of plasma within 48 h. Plasma will not be pathogen-inactivated.

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Duck Cho

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**Korea****Question 1**

Demographics:

- (a) Seoul, Korea.
- (b) Large academic medical centre.
- (c) 1989 beds.
- (d) 59 838 units (2019).
- (e) Confirmed cases: 10 674/Death 236 (2020.04.20).
- (f) About 51 780 000.
- (g) Stable.

**Question 2**

Yes, samples were accepted.

- (h) Yes, some policies or procedures were changed.
- (i) Yes, changes were made as indicated below.
  - (i) After collecting the sample, pack it in resealable translucent bag with marking 'suspected to be infected with COVID-19'. Marking on bag, not tube.
  - (ii) No change.
  - (iii) A fume hood is used.
  - (iv) Gloves, goggles and a surgery mask are used.

- (v) We store the left-over sample and pack it in resealable translucent bag with the marking (suspected to be infected with COVID-19).
- (vi) Sample is transported to the department of microbiology for sterilization or disinfection and then discarded.
- (j) Only samples from patients with known or suspected COVID-19.
- (k) Not applicable.

### Question 3

Coolers are not issued on any patient.

### Question 4

In response to MERS outbreak in 2015, we established a guideline on dealing with samples from patients suspected or confirmed to have been infected with MERS. As for novel pathogens, we have followed the guideline since then.

### Question 5

Our hospital has disseminated COVID-19 education materials to the hospital staff and encouraged them to learn the nature of SARS-CoV-2 and its infectivity.

### Question 6

No notable disparity has been found.

### Question 7

No, we do not anticipate blood component shortages.

### Question 8

One patient in our hospital was transfused with blood from a donor exposed to confirmed COVID-19 cases. Fortunately, the Korean government found that the donor donated blood before exposed to the confirmed cases, and therefore, we concluded that the blood from the donor was safe. Although blood from donors with COVID-19 is generally considered safe, we need to be cautious about it before hard evidence comes out and the government body responsible for controlling COVID-19 should ask confirmed or suspected cases about their recent blood donation history.

### Question 9

For now, we are not considering the use of convalescent plasma from COVID-19 patients as a therapeutic option.

We do not have a system for pathogen inactivation of donated blood in South Korea.

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Fumihiko Nakamura & Akira Hangaishi

## Japan

### Question 1

Demographics:

- (a) Tokyo, JAPAN.
- (b) Large medical centre.
- (c) 749 inpatient beds.
- (d) Approximately 10 000 units of RBCs are transfused per year. Please note that one unit derives from 200 ml blood in Japan, which is different from the US and European countries.
- (e) 12 429 confirmed cases and 328 deaths (24 April 2020).
- (f) 125 960 000 (1 April 2020).
- (g) Increasing.

### Question 2

Yes, samples are accepted.

- (h) No changes were made to testing polices or procedures.
- (i) Not applicable.
- (j) Not applicable.
- (k) Not applicable.

### Question 3

When a cooler is ordered, our process is described below:

- (l) There are no changes to the standard policy. RBCs are imported from Japan Red Cross and stocked in a refrigerator in the laboratory room. RBCs are loaded in a cooler box and brought to the COVID-19 ward.
- (m) The cooler box is kept in the COVID-19 ward, not in the laboratory room. The box is disinfected by alcohol as needed.



- (n) There was one case in which RBC units were returned to the laboratory room because they were eventually unnecessary. The RBCs were discarded because they were stored at room temperature.
- (o) Yes, the answers reflect our normal practice. RBCs stored at room temperature are to be discarded.

#### Question 4

Yes. Samples from patients with novel pathogens are almost always sent to the National Institute of Infectious Diseases which is adjacent to our hospital.

#### Question 5

Nosocomial infection of SARS-CoV-2 occurs in many hospitals. However, the risk of SARS-CoV-2 infection can be reduced by appropriate prophylaxis. From this viewpoint, ICT members at our institute alert us by emails as follows,

- (1) Check axillary temperature every morning. If axillary temperature exceeds 37.5°C or if there are any other symptoms, stay home and report it to a boss.
- (2) Hand washing and masks during conversation are crucial.
- (3) Avoid crowded and/or closed spaces.
- (4) Disinfection of keyboards and smart devices is important.
- (5) Meetings and conferences should be performed online or by emails whenever possible. If a meeting (or a conference) needs to be held face to face, the participants should put on surgical masks and leave a space each other, windows and doors should be opened, and the meeting should be no longer than 30 min. Doorknobs and desks should be disinfected by alcohol after the meeting.
- (6) During lunch break, the staff should leave a space in cafeteria or rest rooms, should not speak too much during a meal, and put on masks and leave immediately after the meal. Windows and doors in the rest rooms should be opened.

#### Question 6

Yes. In comparison to February 2020 (before pandemic), utilization of RBCs, platelets and plasma in April 2020 were reduced by 17%, 47% and 34%, respectively. The trend is probably explained by a marked decline in surgical procedures.

#### Question 7

Yes, we do anticipate blood component shortages.

(p) Yes, in the medium term.

A state of emergency was declared in Tokyo on 7 April. We are afraid healthy donors may hesitate to go outside for blood donation. Japan Red Cross reports that blood donation was reduced by approximately 30% after the declaration of emergency.

RBCs, platelets and plasma are currently supplied by Japan Red Cross without any difficulty. It may be partly explained by reduction of utilization. If this pandemic continues, blood component shortages may occur in the medium term. We have not yet discussed how to avert or minimize shortages.

#### Question 8

Currently no, but we would be happy to share any lessons whenever they will be available.

#### Question 9

No, we are not planning to use convalescent plasma from COVID-19 patients to treat severe forms of the disease.

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Jeannie Callum & Yulia Lin

## Canada

#### Question 1

Demographics:

- (a) Toronto, Canada.
- (b) Academic tertiary care centre.
- (c) 1355 including baby berths and 638 acute care adult beds.
- (d) 10 500 units.
- (e) 42 110 confirmed cases and 2149 deaths.
- (f) 37.6 million.
- (g) Increasing.

*Question 2*

Yes, our hospital does accept samples.

(h) Yes, we did change some pre-transfusion sample testing policies or procedures.

(i) Changes to the process are indicated below.

No change to the label affixed to the sample at the time of collection.

No change to the procedure for accepting the sample.

No change to where the sample was tested.

Yes. Pre-existing routine practices included gloves and laboratory coats worn at all times when in the transfusion medicine laboratory. Surgical masks are now worn by laboratory staff as physical distancing cannot always be maintained in our laboratory space. Splash guards using an absorbent cloth when decapping specimen tubes and decapping specimen tubes behind a plexiglass barrier were implemented before loading tubes on the automation or testing manually.

No change to sample storage after testing.

No change to sample disposal.

(j) The change in process was applied as routine practice for all samples submitted for testing.

(k) Not applicable.

*Question 3*

When a cooler of blood products is ordered our process is as follows:

(l) We are in the process of implementing the following: each RBC unit is placed in a separate plastic overwrap bag with a tamper-evident seal to open only when ready to be transfused by clinical team. If returned, the blood bank is clear whether the plastic overwrap bag was opened.

(m) All coolers are disinfected upon return (routine practice prior to SARS-CoV-2).

(n) If returned in the sealed plastic overwrap bag, the plastic overwrap is discarded and the RBC unit is returned to inventory. If the bag is opened, then at this point, the RBC unit is discarded. In the event of a shortage, we would consider a separate quarantine location such that the unit could be re-issued to a COVID-19 confirmed positive patient.

(o) This practice is being implemented as a result of the novel coronavirus but will apply to all blood products issued in coolers.

*Question 4*

Yes, prompted by Ebola.

*Question 5*

Yes, policies and procedures in place and a town hall-type educational forum on the risks to technologists/technicians from handling samples from COVID-19 patients.

*Question 6*

RBCs 1 February 2019 to 23 April 2019 = 2723 vs. RBCs 1 February 2020 to 23 April 2020 = 2148; PLTs 611 vs. 423 platelet pools/apheresis units; plasma 378 vs. 276 units.

*Question 7*

Some blood component shortages are anticipated.

(p) No in the short term.

(q) In the medium term, we have a possible concern for platelet shortages if the pandemic results in more stringent lockdowns.

(r) In the long term, yes for IVIG and SCIG with a reduction in the amount of plasma collected by the fractionators.

(s) Not applicable.

We have notified physicians to maximize patient blood management (iv iron, epo and tranexamic acid), adhere to 70 g/l threshold in absence of symptoms and prescribe 1 unit at a time in the absence of bleeding for RBCs. We use intravenous iron aggressively for iron deficiency anaemia for chronic blood loss and pregnancy, and perioperatively. We have instructed clinicians to increase the use of tranexamic acid for thrombocytopenic patients and adhere to the  $10 \times 10^9/l$  threshold for hypoproliferative thrombocytopenia. We use PCCs for warfarin reversal exclusively. We do not use cryoprecipitate (fibrinogen concentrate used for all patients, including neonates). Plasma is used primarily for traumas (incidence has dropped during lockdown) and for cardiac surgery (elective cases postponed). We utilize POCT with ROTEM for cardiac surgery-related haemorrhage to allow for targeted transfusion therapy. We have reduced our inventory of RBCs to mitigate the risk of outdated products. We have been keeping the hospital Emergency Blood Management Committee apprised of the National inventory updates from our National Emergency Blood Management Committee.

*Question 8*

Our National and Provincial Emergency Blood Management Committee plans for shortages were robust and have served us well during the pandemic so far. There has been national cooperation by hospitals to reduce blood use and

increase the use of patient blood management to mitigate a shortage. The Canadian public has responded positively with coming out to donate allowing the blood suppliers to maintain inventories across the country. In hindsight, we should have had a plan for the use and evaluation of convalescent plasma developed before the onset of a pandemic given its application in H1N1 influenza, SARS-CoV-1 and MERS. As a result, a protocol was required to be developed in 4 weeks when we could have anticipated its need.

### Question 9

We have planned two randomized clinical trials for the use of convalescent plasma (CONCOR-1 and CONCOR-Kids). CONCOR-1 (NCT 04348656) is a randomized, open-label trial of convalescent plasma vs. standard of care in hospitalized, non-intubated adults with acute COVID-19 respiratory illness requiring supplemental oxygen. The trial is planned for a total of 1200 patients from approximately 50 hospitals in Canada and the United States. The dose is a single 500 ml transfusion (slowly over 4 hours) of apheresis plasma collected from a donor after full recovery from PCR-positive confirmed COVID-19 and with detectable anti-SARS-CoV-2 antibodies. No required titre threshold is required for release of the product. The donor must meet all the standard donor criteria set out by the appropriate regulator (Health Canada and the FDA). The primary end-point is the need for intubation for mechanical ventilation or death at 30 days. Other important outcomes will be the length of stay in the intensive care and hospital, serious adverse events, and the change in viral load between baseline and 48 hours. The trial is expected to take 6 months to complete. CONCOR-Kids is a similarly designed trial in children that will run in parallel. Pathogen inactivation will not be used. Donors between 14 and 27 days after complete recovery will be required to test negative for SARS-CoV-2 by PCR nasopharyngeal swab or by blood testing for RNAemia. At the time of writing, there is currently no plan in Canada to consider an exceptional access programme for convalescent plasma outside of a clinical study.

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Mostafa Mogaddam & Ahmad Gharehbaghian

## Iran

### Question 1

Demographics:

- (a) Tehran, Iran.
- (b) Private Specialty Hospital.
- (c) 200 beds.
- (d) 4200 RBC units.
- (e) 89 328 cases and 5650 deaths.
- (f) 83 000 000.
- (g) Stable.

### Question 2

Yes.

- (h) No, routine universal precautions rules were followed – all samples are considered hazardous.
- (i) Not applicable.
- (j) Not applicable.

### Question 3

If a cooler of blood products was ordered for a patient with confirmed or suspected COVID-19, our process is described below.

- (k) No changes to standard policy, but changes will be made.
- (l) Coolers get cleaned and disinfected weekly or when there is a leak or blood spill.
- (m) Luckily, no units were returned.
- (n) Normal practice.

### Question 4

As an extra precaution notice, a warning flag (Patient under observation) shows up once laboratory staff check the patient's information in the computer system.

*Question 5*

Yes.

*Question 6*

Since all the elective surgeries were cancelled and only labour and delivery section, ICU and floors prepared for coronavirus suspicion were requesting blood products, patient blood utilization lowered to less than 30% of usual situation.

*Question 7*

We do anticipate some blood component shortages.

(o) Yes, in the short term

Adopting more restrictive transfusion thresholds. Elective surgeries cancelled; therefore, less blood was requested.

*Question 8*

Try to be informed quickly as much as possible about the nature and characteristics of the organism involved from trusted, reliable international and national sources who are expert in the matter and change your routine policy accordingly.

*Question 9*

Not in our facility. But our blood supplier Iranian Blood Transfusion Organization (IBTO) is planning to do so. I was told 1–2 units of convalescent plasma. However, the convalescent plasma has been using in some hospitals in Iran. For instance, some large academic medical centres

in Tehran, where are dealing with COVID-19 infected patients have been using the convalescent plasma and a specified facility for collecting such plasma from cured patient has been established in Iranian Blood Transfusion Organization in Tehran as well as the other capital cities in each province (31 provinces) across country and they have to follow similar guidelines/standards that have been prepared and distributed by IBTO headquarter.

It is worth mentioning that Iran is a large and highly populated country and blood transfusion establishment as part of healthcare system is a national and central coordinated over here, which is called Iranian Blood Transfusion Organization (IBTO). Indeed, every blood transfusion establishment in every capital city of Iran Province collects convalescent plasma and distributes to other main cities, which are located inside province and a diversity of the size of collected plasma in each province is observed.

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