



# Indian Society of Hematology and Blood Transfusion (ISHBT) Consensus Document on Hematological Practice During COVID-19 Pandemic

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**Abstract** The SARS-CoV-2 (COVID-19) pandemic is a worldwide public health emergency with widespread impact on health care delivery. Unforeseen challenges have been noted during administration of usual haematology care in these unusual COVID-19 times. Medical services have been overstretched and frontline health workers have

borne the brunt of COVID-19 pandemic. Movement restrictions during lockdown prevented large sections of population from accessing health care, blood banks from holding blood drives, and disrupted delivery of diagnostic hematology services. The disruption in hematology care due to COVID-19 pandemic in India has been disproportionately higher compared to other subspecialties as hematology practice in India remains restricted to major cities. In this review we chronicle the challenges

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encountered in caring for hematology patients during the COVID-19 pandemic in India and put forth recommendations for minimizing their impact on provision of hematology care with special emphasis on hematology practice in lower and middle income countries (LMICs).

**Keywords** COVID-19 · COVID associated coagulopathy (CAC) · Consensus report · Haematology · ISHBT · LMIC · SARS-CoV-2

## Introduction

The SARS-CoV-2 (COVID-19) pandemic is a global public health challenge. More than 10 million cases of COVID-19 have been documented in India and it has resulted in more than 1.5 million deaths. Recent data from the American Society of Hematology (ASH) COVID-19 registry suggests mortality rates of 14% and 65.4% with moderate and severe COVID-19 respectively in patients with hematologic malignancies. Outcomes of COVID-19 in Indian hematology patients remain unknown. There is an urgent need for LMIC-specific guidelines for optimizing hematology care during the COVID-19 pandemic in resource constraint settings. Hence during the early phase of pandemic in India, the executive committee of the Indian Society of Haematology and Blood Transfusion (ISHBT) with its commitment to serve the practice of haematology in LMICs, felt the need for a consensus document which would aid the clinical

and laboratory haematology personnel to deal with haematological diseases during COVID-19 pandemic. As the consensus document had to be made available within a reasonable time frame to retain practical utility; the task was fast-tracked by delegating it to a board of disease-specific experts. The board aimed at reaching consensus on current challenges related to management of hematology illnesses during COVID-19 pandemic in resource constraint settings by adopting the Delphi method, a well-established methodology.

A set of topics covering common hematologic disorders requiring urgent attention were chosen. It also included the laboratory management of COVID-19 samples and their processing. A template of questions was formed which involved common queries and practical difficulties faced while diagnosing and treating patients with hematologic disorders having concurrent COVID-19 infection/exposure. This question template was circulated among various experts throughout the country and their opinion/response was looked for. Over a period of days, the responses received by the experts were compiled as a preliminary document. Some general guidelines and instructions applicable for all patients were added to the document. This was again circulated among the panel of experts and went through several rounds of editing and correction to become a consensus document with the recommendations in a question answer format. The first version of the approved document was posted in the ISHBT website for dissemination of information. [https://www.ishbt.com/pdf\\_files/ISHBT%20COVID-19%20Resource\\_ver1\\_25.08.2020..pdf](https://www.ishbt.com/pdf_files/ISHBT%20COVID-19%20Resource_ver1_25.08.2020..pdf). A condensed form of the consensus report is presented here. This is not a strict guideline as it may be modified with newer evidence-based research.

The purpose of these recommendations is not to change practice, but to help practitioners when faced with difficult situations. Addressing the needs of our country, these are compiled from various published and available online resources with inputs from subject experts. These are the adaptations from various guidelines and recommendations given by national and international bodies for managing haematological disorders like American society of Haematology (ASH), European Haematology Association (EHA), British Society for Haematology (BSH), Thalassemia International Federation (TIF), European Society for Blood and Marrow Transplantation (EBMT) and World Federation of Haemophilia (WFH), Indian Society for Blood and Marrow Transplantation (ISBMT), International Society on Thrombosis and Hemostasis (ISTH). The decisions in individual patients should be taken based on local / regional factors as the evidence for many of these situations is still building up; today it is not a risk-free world and these recommendations are an effort for address the issues in resource-constraint and developing world.

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## Proposed COVID-19 Risk-Categorisation of Patients with Haematological Disorders

All patients undergoing treatment for haematological disorders with immunosuppressive chemo-immunotherapy require COVID-19 testing before treatment for their haematological illnesses. The risk assessment and testing of patients is dynamic in nature and is based on current literature information on COVID-19. Symptomatic COVID cases are to be managed at home or in hospital as per severity of symptoms and prevailing government guidelines. Definite therapy is considered after COVID-19 negative report.

Proposed COVID categories for patients requiring treatment for haematological disorders and their implications is as follows:

- Category 0: RT PCR negative (Not exposed or from non-containment zone), Treatment should be given to patient as in normal scenario.
- Category 1: RT PCR negative (Exposed to COVID-19 positive patient or from containment zone: Treatment should be given if haematological condition warrants or we should call the patient after one week, if clinically stable
- Category 2: RT PCR positive, but asymptomatic. Generally, they should be deferred from immediate haematological intervention, however in certain diseases can go ahead with definitive management.
- Category 3: RT PCR positive, symptomatic, so defer them till COVID recovery, however in certain diseases can go ahead with therapy after explaining risk and benefit to the patient and relatives.

## General Instructions

Today it's a worrisome scenario, probably worst mankind has ever seen and yet we hope to turn it into a safer place again by breaking the chain as we encourage and reinforce the importance of social distancing, hand and personal hygiene, minimal hospital visits, utilization of telemedicine and social media if possible [1]. "Why fight when we can negotiate" approach is a reasonable choice. Home care services should be prioritized to avoid exposure to hospital and health care staff. Supportive Care for haematology patients has been challenged due to constraints in resources like ICU bed, ventilators and trained staff being mobilized for COVID-19 patient care. Blood banks are facing severe shortage of blood and blood products due to lockdown in many parts of country, fear among donors of getting COVID-19 during blood donation and HCWs getting COVID-19 infection. The local situation needs to be explained to patient and their caregivers clearly before

starting treatment. It is recommended using blood products judiciously in sync with various established guidelines. Antifibrinolytic agents like tranexamic acid or epsilon amino caproic acid (EACA) should be used in case of bleeding or at-risk patients, if clinically indicated. Early discharge and switch to oral antibiotics or antifungal should be considered in stable patients. Erythropoietin (EPO), granulocyte colony stimulating factors (G-CSF) should be liberally used if indicated so that hospital stay, and blood products needs can be curtailed. Cancer patients are more vulnerable for COVID-19 [2]. Simultaneous malignancy and COVID is like double whammy, patients are extremely fearful and anxious as a risk of future relapse/progression looms due to compromised care for their primary haematological disorder [3]. Mental health physician has become more important in this pandemic [4].

## Disease Specific Care

### Chronic Myelogenous Leukaemia (CML)

For category 0–1 in newly diagnosed CML in chronic phase (CML-CP), one should go ahead with planned therapy, while ongoing treatment need not be changed for CML-CP.[5]. For category 2–3, we should weigh the risks and benefits of starting Imatinib. Upfront 2nd generation TKI may be delayed until resolution of COVID symptoms in categories 2–3. In view of drug related adverse effects, dasatinib and nilotinib should be avoided in category 2–3. For advanced phase of CML (accelerated phase and blast crisis) one can continue planned therapy in category 0–1 and to consult HSCT guidelines if Allo-SCT is planned [6, 7]. While for advanced phase CML in category 2–3 patients, we should again assess the risk and benefits for starting/continuation of therapy. For category 2–3, single agent TKI (preferably imatinib) is to be considered until patient recovers from COVID-19 illness. In pandemic era, monitoring for CML patients every 3–6 monthly can continue while for those in deep molecular response (DMR), we can go for less frequent monitoring. We should avoid treatment free remission (TFR) trial as it calls for frequent BCR- ABL testing and hospital visits [6]. For those already in TFR, one can decrease frequency of monitoring every 2–3 months. Hospital visits can be reduced for those in major molecular response (MMR) and tele-consultation can be pursued.

### Chronic Lymphocytic Leukemia (CLL)

CLL patients, in general, are considered at high-risk for infections, mainly bacterial and herpes virus family due to underlying immunodeficiency and inadequate immune

response. However, based on limited data available, it seems that the risk for COVID-19 infection per se is not higher. We should initiate therapy for newly diagnosed CLL in Category 0–1 while for category 2–3, wait until recovery is advised. Treatment can be initiated only for symptomatic patients with proper indications for therapy [8]. Wherever possible Ibrutinib should be preferred over FCR or BR because of lower infection and neutropenic risk [8]. For young fit patients, where there is a preference to use Fludarabine based regimen (FCR), caution is advised and consider postponing as there is significant risk of infections with FCR. In situations where Ibrutinib cannot be used, Bendamustine based regimen (BR) or Chlorambucil are the other options. For Category 0–1, ongoing CLL-directed therapies can continue, while wait for recovery in category 2–3.

### Acute Myeloid Leukaemia (AML)

Administration of intensive induction therapy for AML is resource consuming and challenging in this pandemic. However delay in AML induction or administration of suboptimal induction can adversely impact the treatment outcomes. Hence for Category 0–1, one should investigate and treat normally as per institutional guidelines [5]. For category 2–3, it is advisable to wait for 2–3 weeks [9]. Supportive management in the form of hydroxyurea, blood/blood products transfusion and treatment of infections with antibiotics/antifungal to continue along with treatment of COVID-19. For consolidation therapy in Category 0–1, institutional guidelines should be followed. However, one may consider shorter day 1–3 schedule of intermediate-dose of cytarabine. This has been shown to be associated with earlier recovery of neutrophils and less platelet transfusion requirements. For patients who cannot be offered consolidative allogeneic HCT, maintenance with azacitidine as an interim measure can be considered an acceptable option [10–13]. For category 2–3, it is advisable to wait until recovery from Covid-19 infection. Consolidation with allogeneic hematopoietic cell transplantation may be limited at many institutions during ongoing pandemic. For relapsed and/or refractory AML, salvage treatment with Azacitidine and Venetoclax with frequent day-care visits is an acceptable option for patients who are unable to get inpatient admission [5].

For acute promyelocytic leukemia (APML), therapy consisting of ATRA & ATO induction can be initiated in category 0, 1 and 2. However, for category 3, we should wait for Covid-19 recovery. Chemotherapy based protocol likely to have more blood product requirements and risk of neutropenia/infections.

### Acute Lymphoblastic Leukaemia (ALL)

For newly diagnosed Paediatric/Adult ALL one may continue as per institutional practice in category 0–1, while wait until recovery is advised in category 2–3 [5, 14, 15]. Corticosteroids are generally part of standard treatment of COVID-19 infection and hence they can be continued in any category. For adults, may consider reducing anthracycline and L-asparaginase dose to 50% [14]. One can use GCSF to cut the period of neutropenia. For category 0–1, ALL maintenance therapy can be continued and we can avoid vincristine and dexamethasone in maintenance [15]. However for category 2–3 patients, one should hold maintenance until recovery. In MRD negative ALL patients, we can straightaway jump to maintenance therapy [10].

One should be mindful of interactions between ALL drugs and proven/proposed COVID-19 drugs. Azithromycin can increase the toxicity of vinblastine, vincristine. Chloroquine, hydroxy-chloroquine (HCQ) can increase cardiac toxicity of anthracycline [16]. Azithromycin, HCQ, Chloroquine can increase QTc along with TKI (Imatinib, Dasatinib), Inotuzumab. Lopinavir/Ritonavir may increase the vincristine and methotrexate toxicity. Tocilizumab reduces dasatinib, venetoclax concentration by inducing CYP3A4 [16]. Colchicine causes increased toxicity of vinca alkaloids.

### Multiple Myeloma (MM)

For newly diagnosed multiple myeloma one can go for normal therapy in category 0–1 [17]. For category 2–3, we should weigh the risks and benefit based on impending organ dysfunction. Anti-myeloma therapy can be put on hold until recovery for patient with other myeloma defining events (SLiM criteria) [18]. Initial treatment consists of triple therapy (VRD/VTD/VCD), 4–6 cycles, followed by autologous transplant for transplant eligible patients [17]. In case of transplant ineligible, lenalidomide maintenance or triple drug therapy can be employed for standard and high-risk cases, respectively [19]. It is preferable to give subcutaneous bortezomib at home. We can use zoledronic Infusion monthly for 1st six months then change to every 3 months [5]. Denosumab can be considered, if affordable, instead of zoledronic acid, as it can be administered subcutaneous at home. However, Denosumab cannot be stopped abruptly because of increased risk of vertebral fractures and bone loss. In Elderly myeloma, one can consider two drug (with low dose dexamethasone) induction and maintenance based on respective institutional practice [17]. Prophylactic antibiotics can be continued as per institute protocol.

For relapsed/refractory MM oral regimens should be preferred, however, bortezomib-containing regimen can be used if the patient was not exposed at first line. Bortezomib regimens are quite safe and need not be avoided if the patient can be instructed to get the injections at local place with the help of a nurse/ doctor nearby. For indolent biochemical relapse, patient can be monitored instead of initiating anti-myeloma therapy. Weekly carfilzomib schedules can be opted. Similarly, monthly daratumumab can be used to avoid frequent hospital exposure. If patient is transplant eligible, we should follow HSCT guidelines. Stem cell transplant may be delayed after stem cell collection if the facility for stem cell cryopreservation/ liquid nitrogen system is available [18].

### Myelodysplastic Syndrome (MDS)

Patients with MDS are more susceptible to bacterial/fungal infections due to qualitative and/or quantitative neutrophil defect, however their increased COVID risk is not documented convincingly.

For Low to intermediate-risk MDS: Category 0–1: We should follow institutional practice. One should consider use of growth factors EPO and TPO mimetic agents, whenever necessary. For category 2–3, we can hold treatment until Covid-19 recovery. For high-risk MDS: Category 0–1: hypomethylating agents (HMA) may be tried, whereas for category 2–3: we should consider palliation until the patient recovers from COVID followed by treatment as per institutional policy [20–22].

### Myelodysplastic Syndrome/Myeloproliferative Neoplasm (MDS/MPN) and Ph-negative Myeloproliferative Neoplasm

For patients with MDS/MPN and Ph negative MPN, Hydroxyurea can be used for category 0,1 and 2, whereas, rest of the treatment as per institutional practice. For category 3, hydroxyurea/phlebotomy in consultation with COVID physician is needed. We may consider higher hematocrit > 48–50% for phlebotomy along with aspirin as prophylaxis [5, 23]. Heparin administration is standard management in the treatment of COVID pneumonia and it can be given in consultation with COVID physician.

### Hodgkin Lymphoma (HL)

Early stage Hodgkin Lymphoma in category 0–1 can be managed with 2–4 cycles of ABVD and IF(S) radiotherapy (RT) can be done during the COVID-19 pandemic [24]. Wait till recovery is advised in category 2–3. Escalated BEACOPP despite having higher EFS may be avoided during the pandemic [24]. In hospital situations where

radiation is not possible or frequent visits need to be avoided, we can consider PET guided omission of radiation with the understanding that outcomes may be inferior.

For advanced stage Hodgkin Lymphoma, PET guided therapy is helpful during COVID pandemic. For category 0–1, we can employ PET guided approach and reduced use of bleomycin in PET negative patients. For PET positive patients BEACOPP-14 may be safer than Esc BEACOPP. For Category 2–3: one should hold chemotherapy until recovery [5].

For relapsed/refractory Hodgkin Lymphoma in category 0–1: we should follow institutional practice; for category 2–3: can hold chemotherapy until recovery. For young fit patients' standard of care is salvage therapy followed by autologous stem cell transplant. Salvage regimens with nivolumab and brentuximab are not used often as they are expensive. Some of the salvage regimens like Gemcitabine vinorelbine dexamethasone, or Gemcitabine Cisplatin dexamethasone (GDP) may have lower risk of neutropenic complications than older regimens like DHAP or ICE and may be preferred. GDP can be administered in Day Care setting and is preferable over other intensive regimens calling for prolonged hospitalization. Auto transplant should not be withheld if the centre can manage the logistics during the pandemic [7]. For older patients, one should prefer oral metronomic chemotherapy options during the pandemic and reduce risk of neutropenia.

### Non-Hodgkin Lymphoma (NHL)

In cases of aggressive/high grade non-hodgkin lymphoma, treatment should be given as per institutional practice in category 0–1 [25]. For category 2–3, corticosteroids are generally part of standard treatment of COVID 19 infection and hence they can be continued, otherwise, we should hold chemotherapy until recovery. The treatment of low-grade lymphomas is done only if there is a clear indication [26]. For category 0–1, treatment can be started if indicated. For category 2–3, except corticosteroids, one should hold rest of the treatment until recovery. Relapsed patients can be managed by use oral metronomic therapy to reduce frequency of hospital visits and one should consider teleconsultation as far as possible [5].

### Aplastic Anaemia (AA)

All patients of severe and very severe AA may need admission and antibiotics should be prescribed as per institutional protocol. Early discharge and switch to oral antibiotics or antifungal should be considered in stable patients.

Life-saving Allogenic SCT in Category 0–1, should not be delayed whenever possible, especially in case of

matched related donor transplant in view of risk of Covid-19 infection [27]. Transplant to be deferred until recovery in category 2–3 and can be considered after two negative RT PCR reports one week apart [7]. In case of severe or very severe AA, Immunosuppressive therapy (IST) including anti-thymocyte globulin (ATG) should be used as per standard protocol and precautions. Hospital stay should be minimized, and all effort should be put to use home care services, while wait till recovery in category 2–3. Alternative agents in combination like eltrombopag, low dose cyclosporine (2–3 mg/kg/day), danazol/stanzolol can be considered for patients who can stay at home [27, 28].

### Immune Thrombocytopenia

Newly diagnosed ITP in children and adults, requiring treatment due to severe thrombocytopenia, should follow institutional guidelines in category 0–1. Steroids and IVIG can be given for safely category 2–3 [29]. In case of no response, second line agents based on affordability of patient should be given. Stable chronic ITP patient can continue with their low dose steroids. Patient on higher doses (0.5 to 1 mg/kg/day) of corticosteroids or immunosuppressive drugs (Cyclosporin, Azathioprine), can be tried with minimum dose or switch to TPO agonists (Eltrombopag or Romiplostim), if affordable and according to institutional practice [29, 30]. Treatment of a febrile splenectomised patient with ITP remain unchanged in the setting of Covid-19 infection [30].

### Haemophilia

It is advisable to minimize hospital visits for people with haemophilia (PWH) by using telemedicine facility [31]. Paracetamol is a safe antipyretic/analgesic while ibuprofen and non-steroidal anti-inflammatory drugs should be avoided [32, 33]. There is no need to change the recommended treatment regimen for PWH in category 0, 1 and 2 [34]. It is also recommended for haemophilia centres to keep adequate supply of blood and plasma in the current pandemic scenario [34].

### COVID-19 Associated Coagulopathy

Most of the patients with SARS-CoV2 infection in category 3 show derangement in the baseline coagulation profile which includes mild thrombocytopenia or thrombocytosis and raised fibrinogen and d-dimer levels with no/minimal prolongation of APTT and PT-INR [35]. These findings parallels with acute phase reactants like C-reactive proteins (CRP) as a marker of inflammation. Rarely lupus-like inhibitors have been reported as a cause for mild APTT prolongation. Although majority of the Covid-19 patients

have mild abnormality in coagulation parameters, they rarely bleed. It is emphasized that blood products should not be used to correct the deranged laboratory parameters if the patient is not bleeding; rather, this might aggravate the already compromised respiratory reserve and increase the risk for thrombosis. Heparin administration (prophylactic or therapeutic) is part of standard treatment for categories 2–3 [35]. Hence, liaison with Covid physician/specialist is must for overall management of this group of patients.

### Thalassemia Major

Threshold to transfuse blood is same as in pre- Covid-19 phase, though due to lockdown and fear among donors of getting Covid-19, there is possibility of suboptimal transfusion [36, 37]. NGOs, society working for thalassemia, should encourage and raise awareness among donors through social media for blood donation and blood bank should ensure safe donation and transfusion environment. At present there is no evidence of transmission through transfused blood. In view of paucity of data, we suggest continuing iron chelation in category 0, 1 and 2 while for Category 3 holding chelation until recovery is advised [38]. In view of need of hospitalization and myeloablation, leading to increased risk of infection, stem cell transplant should be postponed during first part of pandemic.

### Haematology Laboratory

Some of the significant and frequently deranged haematological parameters are Lymphopenia, alteration in ANC/ALC > 3.5 (considered a poor prognostic marker), thrombocytopenia, thrombocytosis, presence of activated lymphocytes in peripheral blood film (designated as COVIDocytes)—similar to activated lymphocytes seen in any viral infection. Alteration in coagulation parameters is also observed. In addition, serum biochemical abnormalities including of elevated ALT, AST, LDH, Serum ferritin, IL6, CRP are often seen. Although the practice varies as per availability but Complete Blood counts (CBC), complete coagulogram (Prothrombin time, APTTK, D-dimer, Fibrinogen), Liver function tests, LDH, urea, creatinine, CRP procalcitonin, IL 6, Vit D, Calcium and serum Ferritin are some of the commonly ordered tests in COVID patients. Approximately 1% of infected cases can have Viremia. Even though there is no evidence of COVID-19 transmission through blood, one should consider all samples sent to the laboratory as potentially infectious.

Certain precautions to minimise the infection risk during sample handlings are given below. All samples are to be collected in proper vials and should be further placed in a secondary container (small plastic airtight container would be preferred to keep the samples upright) to minimize

potential breakage or spill. All these containers must be sent in a large plastic box with biohazard label (COVID-19). Pneumatic chutes, physical requisition forms should be avoided as much as possible. These plastic and other surfaces can be sterilized with alcohol wipes/ 0.5% hypochlorite prior to and after handling the samples. Follow local institutional/government protocol for the same. The technician or doctor handling the samples should have proper Personal Protective Equipment (PPE)—mask, goggles, face shield, head cover, gown, and gloves. It is preferable to have a dedicated staff, by rotation. Separate dedicated auto-analyser for COVID samples along with direct uploading of lab values to HIS facility is desirable. Peripheral smears should be performed, with care, and if indicated. Prefixation in methanol before staining can be done. Proper decontamination of surface and machines is necessary. Since coagulation work up needs centrifugation, which is aerosol generating, it is necessary to use closed centrifugation system and preferably in a BSL class 2 lab facilities, if available using appropriate PPE with face shield. For persons with known/suspected hematologic abnormality and simultaneous COVID-19 infection, a liaison with COVID physician/specialist and clinical haematologist is must. Non-urgent investigations may be postponed until the person turns negative. Urgently required investigations (e.g. Flow cytometry for haematological malignancies, bone marrow aspiration and trephine biopsy) should be performed after prior discussion with the laboratory/hematopathologist. In case of critical and urgent requirements, same precautions apply. One should be cautious while handling laboratory waste generated from suspected or confirmed COVID-19 patients and institutional/government guidelines for safe disposal of biohazardous waste should be strictly followed.

### Haematopoietic Stem Cell Transplantation (HSCT)

It is important to reiterate that recommendations will change with the evolution of pandemic and availability of resources. Hence recommendations need to be evaluated based on local conditions as some places appear to have crossed the peak of pandemic. Several disease specific and area-specific challenges need to be considered during decision making for HSCT in times of COVID-19.

Testing for SARS-CoV2 is strongly recommended both for patient and donor even if they are asymptomatic during current times [7]. All patients should be RT PCR negative for at least 72 h before the start of their conditioning. In areas where the pandemic is in community stage, non-urgent transplants can be deferred; for e.g., standard-risk multiple myeloma and thalassemia. In regions which are past their pandemic peak, resumption of routine transplant services is advised. For categories 1, 2, and 3 consensus is

to hold transplant until COVID-19 recovery. Wherever possible, HSCT should be deferred for 3 months in patient who have tested positive for SARS-CoV-2 by PCR [7]. In patients with high risk disease, such deferral is not possible. Still we should wait for at least 2 weeks, till patient become asymptomatic and 2 negative PCRs one week apart have been documented. Isolations and deferral for 2–3 weeks are suggested if the patient had contact with a confirmed COVID-19 case.

Although data is limited for a recommendation, but if the donor is positive, then HSC donation should be deferred by 3 months in category 1–2. If transplant is urgent, then asymptomatic donor after 2 weeks of isolation with 2 negative PCRs 24 h apart can be allowed. For category 3, liaison with COVID physician/specialist is advised for best timing of donation. We should not change the conditioning regimen if a graft is being performed as lifesaving or urgent/emergent measure. Nevertheless, wherever possible, reduced intensity conditioning instead of myeloablative conditioning should be preferred. In unrelated donor setting, it is advisable to obtain the stem cell graft and cryopreserve before starting the conditioning. Cryopreserve separate graded dose aliquots of lymphocytes for potential donor lymphocyte infusions from donor stem cell harvests, whenever possible [7]. In unprecedented times, stem cell source may not reach transplant centre in time for several reasons. Wherever possible, a peripheral blood stem cell (PBSC) graft is preferable over bone marrow graft for faster engraftment and early discharge from hospital [39]. There may be a situation where one may have to stick with bone marrow as source of stem cells. Whenever, low stem cell yield is suspected, prefer using Plerixafor and G-CSF. One should avoid chemotherapy-based mobilisation and its complications. Supportive care is an important cornerstone of transplant, especially in this COVID-19 pandemic era. During this pandemic, a liberal use of G-CSF is taken into account. In thrombocytopenic patients, off label thrombopoietin receptor agonists like eltrombopag or romiplostim can be considered.

If a patient has symptoms suggestive of SARS-CoV2 then he/she undergoes testing of both nasal and pharyngeal swab by RT PCR. Positive pressure in BMT unit should be changed negative or neutral. If there is a possibility of shifting to an isolation room in COVID designated area, then transfer the patient.

### Future Directions

Most of the recommendations are based on “expert opinions” due to paucity of relevant data for clinical impact of COVID-19 in hematologic disorders. ASH and CIBMTR have started online registries where haematologists can

upload data regarding their cancer patients [40, 41]. We encourage doctors to report their COVID-19 cases to national or international registries which will help in having robust data backed by evidence, and the big unknowns can be solved.

## Conclusion

With rapidly expanding resources and new data coming in, haematologists need to keep themselves updated, choose and act wisely, so that patient and public can be better served. According to prevailing government directives and building evidence, we must update our practice to minimise the disruption and give the best possible care. While the pandemic will ultimately end, new programs and processes will likely survive long after it's over; some out of necessity, others because of the value they've demonstrated [42].

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