Iraqi Haematology Guideline in COVID-19 pandemic

“Things with haematological cancer are a little bit different as more people are more likely to be immunosuppressed than in other kinds of cancer.”

Many haematology patients who have blood cancers suffer from suppressed immune systems. The World Health Organisation recently declared the COVID-19 outbreak a pandemic, urging countries to take all possible steps to limit the spread of the virus. We are advises that healthcare professionals can help reduce the risk to blood cancer patients may be able to conduct appointments remotely if possible, such as over the telephone. This will help avoid bringing patients to crowded clinics during the outbreak.This advice includes that at-risk patients and their carers should avoid crowded places. They should distance themselves from places where there might be other people with the virus, the charity says.

Patients do not need to isolate themselves at home – as activities such as walking in a park should not pose a risk.

Hospitals are places where patients are at greatest risk. Phone appointments should be used where possible and blood tests can be scheduled away from hospital sites.

People with weakened immune systems who are at increased risk of complications from coronavirus include:

- People having chemotherapy, or who’ve had chemotherapy in the last 3 months;
- People having immunotherapy or other antibody treatments for cancer;
- People having targeted cancer treatments that can affect the immune system, such as protein kinase inhibitors;
- People who’ve had a bone marrow or stem cell transplant in the last 6 months, or who are still taking immunosuppression drugs; and

- People with some types of blood cancer which affect the immune system, such as chronic leukaemia, lymphoma or myeloma, even if no treatment is being given.

Criteria to Guide Evaluation and Laboratory Testing for COVID-19

PRIORITY 1

Ensures optimal care options for all hospitalized patients, lessen the risk of healthcare-associated infections,

• Hospitalized patients

•Healthcare facility workers with symptoms

PRIORITY 2

Ensure that those who are at highest risk of complication of infection are rapidly identified and appropriately triaged

- Patients in long-term care facilities with symptoms
- Patients 65 years of age and older with symptoms
- Patients with underlying conditions with symptoms
- First responders with symptoms

PRIORITY 3

As resources allow, test individuals in the surrounding community of rapidly increasing hospital cases to decrease community spread, and ensure health of essential workers

- Critical infrastructure workers with symptoms
- Individuals who do not meet any of the above categories with symptoms
- Health-care workers and first responders
- Individuals with mild symptoms in communities experiencing high COVID-19 hospitalizations

NON-PRIORITY

- Individuals without symptoms

Upper respiratory tract specimens (nasopharyngeal swab). Testing Lower respiratory tract specimens, if available.

For patients who develop a productive cough, sputum should be collected and tested for COVID-19. The induction of sputum is not recommended.

For patients for whom it is clinically indicated (e.g., those receiving invasive mechanical ventilation), a lower respiratory tract aspirate or bronchoalveolar lavage sample should be collected and tested as a lower respiratory tract specimen.

Specimens should be collected as soon as possible, regardless of the time of symptom onset.

Close contact is defined as :—

a) being within approximately (2 meters) of a COVID-19 case for a prolonged period of time; close contact can occur while caring for, living with, visiting, or sharing a healthcare waiting area or room with a COVID-19 case.

– or –

b) having direct contact with infectious secretions of a COVID-19 case (e.g., being coughed on)

If such contact occurs while not wearing recommended personal protective equipment or PPE (e.g., gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection), criteria for PUI consideration are met.

COVID-19 (coronavirus) advice for patients with Chronic Myeloid Leukaemia receiving TKI therapy

• Patients with CML **do not** appear at a higher risk of getting COVID-19, although data is limited.

• CML patients can be at a higher risk of COVID-19 infection if they are older (age over 70 years), have other medical conditions or are receiving other treatment which will suppress the immune system.

• There are no published data on the course of the COVID-19 infection in CML patients treated with tyrosine kinase inhibitors (TKI) and reports are rare.

Reassuringly, very few CML patients on TKI therapy were infected in the Hubei province in China, and the outcome was similar to the general population.

• Having a diagnosis of CML or being treated with TKI therapy does not convincingly cause clinically significant immune suppression.

- Self-isolation (self-quarantine) for 12 weeks is recommended for at-risk individuals, but in our specialist opinion, the diagnosis of CML or treatment for CML alone does not fall in this category.
- Patients **should not** interrupt or reduce their TKI medication without the advice of their CML specialist team.

COVID-19 Outbreak: Advice for Patients with Myeloproliferative Neoplasms (MPNs)

1. There is currently no evidence that patients under 70 with a myeloproliferative neoplasm (ET or PV) who are on aspirin alone, blood thinning tablets (like warfarin, apixaban or rivaroxaban), venesection alone are at increased risk of COVID-19 infection compared with the general population.
2. Patients over the age of 70 with an MPN, or any MPN patient with additional illnesses such as heart disease, high blood pressure or diabetes, are considered more vulnerable to COVID-19 infection.
3. Patients under 70 who are on medications to control their blood count or their MPN , for example Hydroxycarbamide, Interferon, Anagrelide or Busulfan are in a group where the situation is unclear. Currently there is no clear evidence that these patients are at increased risk of COVID-19 infection.

4. Patients with myelofibrosis and those taking ruxolitinib have a weakened immune system and severe infections from other viruses have previously been reported in this patient group. These patients are therefore likely to be at increased risk of COVID-19 infection and should take the most stringent precautions.

5. All patients should continue with their current medication because keeping good control of your MPN is an important priority. If a patient with an MPN develops COVID-19 infection, in most cases it will remain appropriate to continue current medications, but this should be discussed with healthcare team and considered on a case by case basis.

6. While there have been some concerns that ibuprofen or similar drugs may make COVID-19 worse, there is no current suspicion that this is the case for aspirin.

7. The life expectancy for many patients with an MPN is similar to that of the general population. Although MPNs are classified as a blood cancer, under most circumstances the diagnosis of a MPN is not expected to have a negative impact during assessment for treatment of COVID-19.

It is expected practice to ratify decisions at the MDT, and to discuss with colleagues any urgent or difficult decisions in between MDTs. All such conversations should be documented in the patient record.

Who/when to treat

Newly Diagnosed Patients

Patients fulfilling the CRAB criteria (hyper-calcaemia, renal impairment or bone disease) should be offered primary treatment (rationale: untreated newly diagnosed myeloma in these groups is likely to be fatal in 3 months or less and delay may adversely affect disease-related morbidity, quality of life and survival ship)

Patients who fulfil the SLiM part only of the SLiM-CRAB criteria or who only have anaemia should be monitored (rationale: SLiM criteria patients have an 80% chance of needing treatment in the 2 years after diagnosis- spreading this population across the 2 years reduces demand and infection risk).

First-line treatment

Transplant eligible patients.

Bortezomib/dexamethasone with either thalidomide/Lenalidomide (VTD/VRD) or cyclophosphamide (VCD).

Use once weekly bortezomib for the full 6 cycles. If twice a week is needed for rapid response, de- escalate to weekly as soon as response achieved. Use 20mg of dexamethasone weekly or lower.

Transplant ineligible patients.

Lenalidomide/dexamethasone for 9 cycles then single agent Lenalidomide (rationale- Larocca et all 2019). For those patients already on Len/dex, consider de-escalating steroid after cycle 9.

Relapsed patients

Those patients with clinically significant relapse should be offered second/third etc line therapy if the benefit (e.g. reversal of renal impairment, new bone disease) outweighs the risk. For those with biochemical relapse, deferment of treatment should be considered but this should be based on clinical concern or the rate of disease progression.

For patients who would ordinarily be candidates for second transplant, then Daratumumab/bortezomib/dexamethasone (weekly) should be initiated unless contra-indicated (under present NHSE guidance this would negate a second transplant at this line of therapy).

If there is an option, then consider using an oral rather than IV/SC regimen to reduce hospital attendances (such as Rd based regimens) including less commonly used regimens such as alkylator or thalidomide-based especially if not previously exposed.

Other chemotherapies of note

DT-PACE

Only to be used if no other likely effective options available or rapid disease control is critical (e.g. plasma cell leukaemia) due to capacity constraints and immunosuppressive effect. The all oral regimen, TIDE (thalidomide, idarubicin, dexamethasone and etoposide) is an alternative that could offer clinical benefit.

Pomalidomide-based regimen

Levofloxacin interacts with Pomalidomide, so alternative prophylaxis may be required.

Stem cell harvest

It is, at this time, still reasonable to proceed with stem cell harvest at end of induction with a plan for deferred transplant according to local capacity.

Consider switch to GCSF only priming to reduce the immunosuppression and myelosuppression associated with high dose cyclophosphamide. It is more likely that salvage plerixafor will be needed and an additional day of apheresis.

Stem Cell Transplant

Autologous stem cell transplant is not a curative process in myeloma. It renders the patient immunocompromised for 3-6 months afterwards. Thus at present, we are recommending not to proceed with autologous transplant except in clinical high risk disease (genetically defined high risk; clinically aggressive disease, Extra-Medullary Disease) patients where a judgement should be made about the risk of progression without transplant.

Most patients will be stable for a few months. To increase the chances of stability, ensure full number of cycles of treatment (VTD, VCD for example) have been given.

Allogeneic transplant should be deferred and the patient placed on/resume continuous therapy if possible (rationale, cure fraction low infectious burden very high).

Supportive care

Bisphosphonates

Consider either extending the dosing interval or switching from intravenous bisphosphonates to oral clodronate- consider giving patients a 3 month supply of oral medications to reduce hospital attendance.

Antibiotic prophylaxis

All patients on treatment should receive cotrimoxazole prophylaxis if tolerated.

Ensure Levofloxacin prophylaxis for 12 weeks is offered to all patient starting induction therapy.

Erythropoitin

Consider erythropoiesis stimulating agents (ESAs) to prevent the need for blood transfusions where indicated and reduce visits to hospital

GCSF

Consider GCSF to reduce the need for additional monitoring blood tests and to reduce additional visits in those patients on myelosuppressive regimens.

COVID-19 infection in patients with aplastic anaemia

Treatment with

- Very severe AA
- Severe AA
- Non-severe AA

14. Treatment of the AA during COVID-19 infection (please tick as appropriate, or Y/N/not known/too early)
    - Supportive care alone:
    - ATG+CSA
        - Type: horse/rabbit
    - CSA alone
    - Eltrombopag
        - Given with ciclosporin:
        - Given with ATG + ciclosporin:
    - Other treatment

Definition of AA disease severity

Severe AA	• BM hypocellularity <25% • 2/3 of the following: 1. Neutrophils <0.5 x 10^9/l 2. Platelets < 20 x 10^9/l 3. Reticulocytes <60 x 10^9/l
Very severe AA	As for severe AA but neutrophils <0.2 x 10^9/l
Non-severe AA	Patients not fulfilling the criteria for severe or very severe aplastic anaemia

Practical guidance for the management of adults with Immune Thrombocytopenia during the COVID-19 pandemic

Thrombocytopenia was described in 36% of patients hospitalised with COVID-19 in one of the early papers (Guan et al., 2020), although subsequent studies have not confirmed this high frequency.

Recommendation

Thrombocytopenia in COVID-19 positive patients is likely to be multifactorial.

- Very low platelet counts of <20 x 10^9/l, or a sudden fall in the platelet count >50% over 24-48 hours may indicate an immune aetiology.
- Other causes of immune thrombocytopenia, such as HIT, MAHA and drugs, should be considered before a diagnosis of ITP is made.
- One should be mindful of a potential further increased thrombotic risk in patients with COVID-19 from ITP or its treatment, although currently this is unknown.

Management of new/relapsed ITP

Like all viral infections, COVID-19 may trigger a new presentation of ITP, as illustrated in a recently published case report (Zulfiqar, 2020), or it may cause

relapse in an existing patient. The need to actively treat ITP is unchanged from current consensus guidelines (Provan D et al., 2019) however, the additional potential burden of treatment in the context of the COVID-19 pandemic (for example greater hospital contact and immunosuppression and/or thrombotic risk) need to be carefully balanced against the risks of bleeding from ITP. Treatment decisions may differ depending whether the patient is COVID-19 negative or positive.

First line therapy

Standard first line therapy for the management of new or relapsed acute ITP is prednisolone, given at a dose of 1mg/kg (max 80mg) for 2 weeks and thereafter tapered off, slowly if there is a good response, or rapidly if treatment is ineffective (Provan D et al., 2019).

There are few data to inform whether or not steroids pose a higher risk of the development of COVID-19 infection or worsening symptoms once infected. However, current guidance from the WHO is to avoid steroids if there are alternative treatment options (WHO 2020). In patients who are negative for COVID-19 infection, using thrombopoietin receptor agonists (TPO-RAs) as first line therapy may be the preferred option. This use is off-label and local funding may need to be sought through the COVID-19 Interim Measures scheme. One should be mindful that TPO-RAs can take 10-14 days before an effect is seen and if urgent platelet elevation is needed, intravenous immunoglobulin may be required.

For patients who are COVID-19 positive, the treatment dilemma is even more pronounced. A concern with the use of TPO-RAs for initial treatment is the increased thrombotic potential, which might exacerbate venous thromboembolic risk in a patient with COVID-19. Steroids may be the preferred option for initial treatment. There is concern about higher risks of mortality and secondary infection which were shown in a systematic review of observational studies of corticosteroids in patients with influenza; however, most related to high steroid doses (>40mg

methylprednisolone per day) and the evidence was judged as very low to low quality, owing to confounding by indication (Lansbury et al., 2019). Another study that addressed this limitation by adjusting for time-varying confounders found no effect on mortality (Delaney et al., 2016). Finally, a recent study of patients receiving corticosteroids for MERS used a similar statistical approach and found no effect of corticosteroids on mortality but delayed clearance of MERS-CoV from the lower respiratory tract (Arabi et al., 2018).

Whilst further evidence is awaited, steroids may be the better option for COVID-19 positive patients presenting with new or relapsed ITP, however the dose and duration of treatment should be kept to the minimum necessary. Starting doses of 20mg daily (whatever the patient's weight) may be considered in non-bleeding patients, and increasing after 3-5 days if no response. Long courses of steroids should be avoided, and the usual recommendation of tapering after 2 weeks should be adhered to.

Thrombopoietin receptor agonists

Current licensed TPO-RAs used in the UK include romiplostim and eltrombopag. They are effective in stimulating platelet production, with responses seen from 7 - 10 days in the majority of cases.

Concern has been raised regarding their prothrombotic potential. This was supported by a recent in vitro study of samples from 26 patients which showed that those with ITP had increased microvesicle-associated thrombin generation two weeks after initiation of TPO-RA-treatment compared with controls and pre-treatment levels (Garabet et al., 2020).

Systematic review of trials looking at clinical thromboembolic events has found higher rates in patients on TPO RAs compared with controls (Catala-Lopez et al., 2012) and a long-term clinical study of eltrombopag showed 6% of patients developed arterial or venous thrombosis (Wong et al., 2017). There are similar findings with romiplostim but direct comparison with placebo, showed no increase in thrombotic risk (Cines et al., 2017, Kuter et al., 2019), however, as expected, risk of thrombosis increases with age (Kuter et al., 2019).

Hepatobiliary events have been found to occur in 15% of patients on eltrombopag (Wong et al., 2017) and the drug carries a black box warning for risk for hepatotoxicity. Although clinically significant liver injury has reported to be uncommon in COVID-19 (Bangash et al., 2020), liver enzymes are usually elevated and the required monitoring of liver function tests throughout treatment with eltrombopag (Promacta®, 2018, Revolade, 2018), would be complicated. Although there are no data on the use of TPO-RAs in COVID-19 positive patients, the risk of hepatotoxicity and potential for increased thrombosis would prompt caution with their use in this setting.

Intravenous Immunoglobulin

Intravenous immunoglobulin (IvIg) may be necessary if immediate elevation of the platelet count is required to control bleeding, although this cannot be relied upon as indicated in a recent case report of ITP occurring in the context of COVID-19 infection (Zulfiqar, 2020). IvIg may also be used as second line treatment if there is failure to respond to steroids. Response usually lasts for 6 weeks or more and may be long enough to cover the worst of the pandemic period. However, administration requires hospital attendance, supply is short and whilst clinical complications are rare, they can be significant.

The role IvIg may play in the management of patients with severe COVID-19 infection is unknown. A small retrospective study from Wuhan suggested that initiation of IVIG as adjuvant treatment for COVID-19 pneumonia within 48 hours of admission to intensive care may reduce the use of mechanical ventilation and promote earlier recovery of patients (Xie et al., 2020). Larger studies are required before any recommendations can be made of the use of IvIg for COVID-19 infection.

Tranexamic acid

Tranexamic acid (TXA) inhibits fibrinolysis and while it is contraindicated in frank DIC, the COVID-19 associated coagulopathy (CAC) does not fulfil the ISTH criteria for DIC. However localised fibrin thrombi occur in the alveolar capillaries and small vessels in association with inflammation and alveolar damage (Fox et al., 2020), and endogenous fibrinolysis breaking down the disseminated thrombi could theoretically aid recovery from this. Therefore, in a bleeding patient with COVID-19 disease, judgement should be made regarding the balance of risks associated with bleeding and thrombosis. If tranexamic acid is used, the duration of treatment should be kept to the minimum necessary. For oral bleeding, tranexamic acid mouthwashes can be given to rinse and spit out.

Interestingly, a recent report in Physiological Reviews proposed that the endogenous protease plasmin acts on COVID-19 virus by cleaving a newly inserted furin site in the S protein portion of the virus resulting in increased infectivity and virulence (Ji et al., 2020). Blunting of this response with tranexamic acid has been postulated to reduce infectivity of the virus and an exploratory, randomised, placebo-controlled, double-blind Phase 2 clinical trial is being established (Ness, 2020).

Immunosuppressant drugs and rituximab

There is concern that immunosuppressant drugs and rituximab increase risk of COVID-19 infection and these should be avoided in new or relapsed patients during the COVID-19 pandemic if possible.

Platelet transfusions

Platelet transfusions are not usually necessary or helpful and should not be routinely offered to thrombocytopenic COVID-19 patients who are not bleeding. In patients with immune thrombocytopenia they are likely to be consumed too quickly to be of value. Platelet transfusions should only be given if it is considered that haemorrhage is life-threatening or in a critical site such as the eyes

Recommendation

There is little evidence to inform the optimal management of a patient presenting with new or relapsed acute ITP.

In patients who are negative for COVID-19, TPO-RAs may be preferred as first line treatment, to avoid corticosteroids which may increase risk of COVID-19 infection during the pandemic.

In patients who are positive for COVID-19, TPO-RAs may potentially increase the thrombotic complications or hepatotoxicity and should be avoided if possible. For these patients steroids may be the preferred option.

If steroids are used as first line therapy, the dose and duration should be kept to the minimum necessary.

Starting dose of 20mg daily may be considered in non-bleeding patients, with increase to 1mg/kg after 3-5 days if there has been no response.

Steroid doses should be tapered after 2 weeks – slowly if there has been good response, rapidly if there is no response.

Intravenous immunoglobulin (1g/kg) may be necessary if immediate elevation of the platelet count is required to control bleeding. It may also be used as second line treatment if there is failure to respond to steroids.

Tranexamic acid in COVID-19 infected patients should be used as required for the management of bleeding in ITP patients, but avoided in those with frank DIC.

Platelet transfusions should only be given if bleeding is thought to be life threatening, or at a critical site.

Management of chronic ITP

Management of patients with chronic stable ITP should not alter because of the pandemic, patients should remain on their current medication, even if this includes steroids and immunosuppressants. However attention to isolation procedures is crucial. The British Society for Rheumatology provides helpful guidance on shielding measures for patients on immunosuppressants (Figure 1).

Patients with splenectomy are probably not at increased risk of COVID-19 infection but are susceptible to bacterial infections and must be vigilant with their prophylactic antibiotics during this time and up to date with their pneumococcal, haemophilus influenza and meningitis vaccinations.

ITP patients not requiring treatment in the last 12 months, or on non-immunosuppressive agents such as thrombopoietin receptor agonists, are not

considered to be at increased risk of COVID-19 infection and should comply with self-isolation measures as for all individuals in the UK.

Recommendation

Patients with chronic ITP should remain on their usual treatment.

They should be vigilant with self-isolation and shielding measures as appropriate.

Splenectomised patients should be stringent with their antibiotic prophylaxis and up to date with vaccinations.

Regular patient contact should be maintained and appointments conducted by telephone or online platforms.

Thromboprophylaxis in hospitalised COVID-19 patients

Potential risk factors for venous thrombosis in patients hospitalised with COVID-19 include infection, immobilisation, respiratory failure, mechanical ventilation, and central venous catheter use. Those with or without ITP should be considered for venous thromboprophylaxis, according to NICE guidance. This needs to be balanced against the bleeding risk which is seen in some patients with severe COVID-19 infection, even without thrombocytopenia (Wang T et al., 2020). Low molecular weight heparin is the preferred anticoagulant, with clinical trials showing it to be more efficacious than UFH. It also has anti-complement and anti-inflammatory properties. LMWH should be avoided if platelets are $<30 \times 10^{9}$/l and intermittent

pneumatic compression should be used. The LMWH should be recommenced once the platelet count can be raised above this threshold. Regular assessment of both bleeding and thrombotic risk is essential throughout the course of the hospital stay and upon discharge.

Recommendation

ITP patients hospitalised with COVID-19 should receive LMWH thromboprophylaxis provided platelets are >=30 x 10^{9}/l and there are no haemorrhagic features.

ITP patients hospitalised with COVID-19 whose platelets are <30 x 10^{9}/l should receive intermittent pneumatic compression alone until their platelet count recovers.

Bone marrow transplant

Prophylaxis and treatment:

At this time there are no proven effective anti-viral agents recommended specifically for CoV-19, however anti-microbial therapy should be optimised with treatment directed according to any positive isolates. There is emerging evidence that part of the COVID-19 pathology is due to an inflammatory response to the virus that occurs 5-7 days following the appearance of symptoms.

Pre-SCT:

deally all patients should be screened before starting conditioning, as there is an asymptomatic period screening should be repeated at least twice, 1 week apart, but practice may vary between institutions. However it would be appropriate to screen transplant patients prior to the start of conditioning if they have a history of recent contact with symptomatic individuals (travel to high risk countries is rapidly becoming a redundant screening tool). As a preventative measure patients should be advised to avoid crowded places, public transport, use good hand hygiene measures and ideally remain in self-isolation for 14 days prior to the start of conditioning.

Any planned transplant should be reviewed and deferred if possible. It is anticipated that the peak risk from infection in the community will be in mid-April and may last up to 9 weeks and possibly longer. Whenever possible SCT should be deferred. This is in order to reduce the pool of high risk patients and in anticipation of a shortage of intensive care beds and possibly trained BMT unit staff.

Any patients testing positive for COVD-19 prior to SCT should be delayed by at least 3 months, however this is not always possible due to the risk from the underlying disease. Therefore, in patients with high risk disease, HCT should be deferred until the patient is asymptomatic and has three repeated virus PCR negativity at least one week apart (deferral of 14 days minimum). In patients with low risk disease a three-month HCT deferral is recommended.

Autologous transplant recipients

- Emerging consensus that when possible autologous transplants should be deferred by at least 3 months, with case-by-case decisions. Advice may be available regarding which patients to defer and how to manage patients during the deferral period from the disease specific specialist groups, UK Myeloma Forum and Lymphoma Specialist Interest Group.
- Asymptomatic recipients should be screened for respiratory viruses and COVD-19 at least once 72 hrs prior to the start of conditioning.
- Minimize the use of chemotherapy priming, use GCS-F alone.
- Autologous SCT for non-malignant indications should be deferred until the peak of COVID-19 passes.
- Allogeneic transplant recipients
- Careful planning required for the preparative regimen as donor cells may need to be cryopreserved prior to starting condition (see donor section).
- Asymptomatic recipients should be screened for respiratory viruses and SARs-CoV-2 at least once 72 hrs prior to the start of conditioning.
- Defer transplantation for any non-urgent indications. This will require allo-SCT MDT discussion on a case by case basis. Examples would be for MDS, MPD.

- Patients and relatives should receive instructions regarding isolation and preventative measures, this should be repeated and supported with written information.
- If close contact with COVID-19 individual immediately prior to transplant defer transplant for 3 weeks if possible (EBMT guidelines), test if symptomatic following local infection control guidelines.
- Patients who test +ve pre-SCT should be deferred where possible by at least 3 months until asymptomatic with viral throat swab negative x 3 tests, 1 week apart (EBMT guidelines). In patients with high risk disease HCT should be deferred until the patient is asymptomatic and has three repeated virus PCR negativity at least one week apart (deferral of 14 days minimum).

Allogeneic donors

- Advise sibling donors to avoid crowded public places, practice good hygiene and avoid large group gatherings for 28 days prior to donation (EBMT Guidelines). Screen donors if symptomatic and prior to starting conditioning. Advice may change soon to screen at the medical and again 2 days prior to donation. Consider harvesting sibling and cryopreserving stem cells prior to conditioning.
- Donors will be excluded from donation for 3 months if proven COVID-19 or for 4 weeks if in close contact with COVID-19 case. Screening for COVD-19 will be required. If no suitable alternate donors and SCT urgent, perform risk assessment and lease with registry. In this situation the recipient should be involved in the discussion and be informed of the donor situation.

- In case of travel to high risk areas for COVID-19 (as defined by health authorities) or being a close contact with person travelling from such an area, donor shall be excluded from donation for at least 28 days.
- Identify back-up donor from different country or cord in case harvesting/transport of 1st donor problematic (Anthony Nolan will facilitate).
- There have been concerns that SARS-CoV-2 may be passed via blood products. Although viral RNA has been detected in blood samples of patients with COVID-19 there have been no reports of transmission of infection by blood products.

Peri and Post-transplant:

- Minimise the number of family members that visit patients. Educate all family members on hand hygiene, and how to avoid potential contact risk behavior.
- Patients should be managed in strict protective isolation; risk assess the need for any investigations and procedures that remove the patient from their isolation room, there may be a greater risk from exposure to SARS-CoV-2 than from not having the investigation.
- Patients who are known to be SARS-CoV-2 +ve should be isolated in negative pressure cubicles wherever possible, failing this in a neutral pressure cubicle. When seeing such patients, healthcare professionals should wear full PPE including gowns, FFP3 masks, gloves and visors.
- At present it is unlikely to be feasible to screen ward staff in contact with patients routinely because of availability of testing and the pick-up rate in asymptomatic individuals is unknown.

After discharge:

- This will be the time of greatest risk to transplant recipients.
- At discharge reinforce need for self-isolation of the transplant recipient and if possible the immediate carer.
- Minimize clinic visits, consider how patients travel to the centre and try to reduce risks from public transport. Hospital transport may become limited.
- Set up telephone follow-up clinics, explore ways for patients to have blood tests away from busy areas in hospitals.