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Abstract

In late December 2019, a cluster of atypical pneumonia cases was noticed in Wuhan, China, which was later identified as an outbreak of coronavirus disease 2019 (COVID-19). Since then, it has spread globally, causing public health emergency and urgency, and declared as a pandemic by the World Health Organization (WHO). As of 1 April 2020, the data shows more than 200 countries and territories have been affected, with more than 824,000 confirmed cases and 41,000 deaths. Across the globe, many cancer patients visit the hospital and clinics for treatment and investigations. A large number of this population are immunocompromised, either due to their underlying disease or cancer treatments which put them at higher risk for infection and complications. In addition, several risk factors have been identified that increase the risk and severity of infection with COVID-19, and cancer patients commonly have many of them. Recently, a large retrospective study among cancer patients infected with COVID-19 in Wuhan, China, found a higher incidence of severe events in cancer patients compared to patients without cancer. As doctors working amid this pandemic, we all have responsibilities and duties to act upon local guidelines to ensure the continuation of essential cancer services without overwhelming the health care system. In this review, we addressed the potential challenges and possible actions for clinicians to manage cancer patients during this unusual time.

Keywords

Recommendations., Cancer, Coronavirus disease 2019, Management, : COVID-19

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Suggestive approach for handling cancer patients during the COVID-19 pandemic: Perspectives from a developing country on how to adapt current practice

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Abstract

In late December 2019, a cluster of atypical pneumonia cases was noticed in Wuhan, China, which was later identified as an outbreak of coronavirus disease 2019 (COVID-19). Since then, it has spread globally, causing public health emergency and urgency, and declared as a pandemic by the World Health Organization (WHO). As of 1 April 2020, the data shows more than 200 countries and territories have been affected, with more than 824,000 confirmed cases and 41,000 deaths. Across the globe, many cancer patients visit the hospital and clinics for treatment and investigations. A large number of this population are immunocompromised, either due to their underlying disease or cancer treatments which put them at higher risk for infection and complications. In addition, several risk factors have been identified that increase the risk and severity of infection with COVID-19, and cancer patients commonly have many of them. Recently, a large retrospective study among cancer patients infected with COVID-19 in Wuhan, China, found a higher incidence of severe events in cancer patients compared to patients without cancer. As doctors working amid this pandemic, we all have responsibilities and duties to act upon local guidelines to ensure the continuation of essential cancer services without overwhelming the health care system. In this review, we addressed the potential challenges and possible actions for clinicians to manage cancer patients during this unusual time.

Keywords: COVID-19, Cancer, Coronavirus disease 2019, Management, Recommendations.

INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was the name given to describe the first cases infected with coronavirus 2 in Wuhan, China, which lead to coronavirus disease 2019 (COVID-19) [1]. The zoonotic coronaviruses family has previously caused two outbreaks, the first was in 2002-2003 and called severe acute respiratory syndrome (SARS) and the second was the Middle East respiratory syndrome (MERS) in 2012 [2]. The novel coronavirus disease (COVID-19) has easy transmission between humans by contact with the droplets of infected persons through respiratory secretions or contaminated materials, and its clinical course can range from asymptomatic (silent carrier) or mild infection to severe respiratory

failure [1, 3]. The death rate from the coronavirus varies widely between countries. As of the end of March 2020, data showed the global death rate ranging from 0.8% to 15.7%; this largely depended on the country's health-care system, testing capacity and the characteristics of the population [4]. Case fatality rate or death rate is also markedly higher in people with comorbidities like hypertension, diabetes mellitus, cardiovascular disease and respiratory issues [4]. Therefore, it was extremely essential for all countries to implement early strict safety measures, in order to limit its transmission worldwide and prevent a global catastrophe.

Several researches and reviews have been conducting globally to present the challenges that cancer patients face during the COVID-

19 pandemic and guide their management from diagnosis to the point of complete recovery or palliation [5-18]. Some of these focused on specific cancer types (such as lung cancer) or specific phase of cancer treatment whereas other guidelines suggested general recommendations for managing cancer patients [5-7, 9-12, 15-18]. In Palestine, guidelines for handling urological surgeries during the COVID-19 pandemic were recently published with collaboration of regional team [19]. Other Recommendations were also released for safe and effective practice of interventional cardiology during the COVID-19 pandemic [20]. Furthermore, the Palestinian ministry of health published a national protocol to deal with the COVID-19 pandemic and manage the infected cases [21]. Among these guidelines, there is no definite recommendations for handling cancer patients during the COVID-19 pandemic in Palestine.

During this global pandemic, the cancer population faces many difficulties and unanswered questions about their health situation. Additionally, the pandemic will require health-care workers to make difficult decisions, including inventing prioritization criteria for treatment. For cancer patients, the possibility of gaining benefit from their treatment may outweigh the risk of death from this virus. For that, we will discuss first the risk of getting infected with COVID-19 among this community according to the latest research done. Then, we will try to manage every step involved in their treatment, rather than definitive guidance, taking into consideration the safety measures among endemic area of COVID-19.

Cancer patients are a high risk population

Cancer affects a large number of people worldwide. In 2018, 17 million new cases were diagnosed with cancer globally, and there will be 27.5 million new cases of cancer each year by 2040 [22]. The current pandemic has put the health of cancer patients at risk, as many of them will need to leave their home to seek help from hospitals for treatment or acute events. In addition, cancer treatment per se is a predisposing factor for infections like COVID-19, as it blunts the immune status, decreases immunosuppressive cytokines, and increases pro-inflammatory signals similar to

what is believed to happen in COVID-19 [23]. At first, Liang et al in China described how COVID-19 outcomes varied between cancer and non-cancer patients. They found that cancer as a comorbidity was associated with increased risk of death and intensive care units' admission. However, data could not be generalized because the sample size was very small, as the report included data from only 18 cancer patients [24]. In another study, which was also in China and a little larger in sample size than the previous study, 28 cancer patients with laboratory-confirmed COVID-19 were described. 53.6% of the patients developed severe events, 21.4% were admitted to ICU, 35.7% had life-threatening complications, and 28.6% of the patients died [24]. Another study was done in China with a larger sample size, involving 105 hospitalized patients with cancer and 233 patients without cancer. In this study, COVID-19 patients with cancer compared to COVID-19 patients without cancer had more severe outcomes, particularly patients with blood cancer, lung cancer, and cancers in metastatic stages [8]. Research has also been underway in Europe, particularly in Italy, which has been badly hit by COVID-19. In Italy, analysis of a sample of 355 out of 2003 who died (17.7%) showed 72 patients (20.3%) had history of active cancer concurrent to COVID-19 infection. Furthermore, a high percentage of those who died had underlying diseases that could have increased their risk of death independently of the infection. Of all patients who died, 117 (30%) had ischemic heart disease, 126 (35.5%) had diabetes, 72 (20.3%) had cancer, 87 (24.5%) had atrial fibrillation, 24 (6.8%) had dementia, and 34 (9.6%) had had a stroke [25]. Regarding case fatality rate, up until February 20, 2020, the case fatality rate for patients with cancer as a comorbidity in COVID-19 infection in China was 7.6%, compared to 13.2% for those with cardiovascular disease, 9.2% for diabetes, 8.4% for hypertension, and 8.0% for chronic respiratory disease. Meanwhile the overall death rate was 3.8%, and the case fatality rate for those who reported no comorbid conditions was 1.4% [3].

COVID-19 represents a major threat to cancer patients' lives, in terms of pathophysiology as well as the circumstances that sur-

round social distancing measures, e.g., the disruption of the routine health-care system. Thus, clinicians, nurses and other health-care providers should attempt to provide the required care, with referral to a local guideline.

Challenges during COVID-29 pandemic

When the WHO declared COVID-19 a pandemic, hospitals started to reorganize their wards and activities to deal with the increasing number of COVID-19 patients that required admission [26]. Moreover, the threat posed by the rapidity of disease dissemination that could overwhelm health-care facilities, compounded by potential infection of the medical staff with COVID-19, in addition to quarantine, travelling-bans, and resource constraints disrupting supply chains, all may mandate prioritization or modification of patients' cancer therapies. Thus, the oncology community may be forced towards selection of patients who should receive anti-cancer treatment based on the clinical data on who will get the most benefit [27]. Oncologists and hematologists will have to weigh the risk of developing COVID-19 in severely immunosuppressed patients against the risk of disease progression, taking into consideration the health-care services' conditions and shortages of medical supply.

The clinical presentations of COVID-19 are varied, ranging from asymptomatic and mild, to severe pneumonia and ARDS. Therefore, the diagnosis of this novel infection could be challenging in patients with cancer, particularly in those with lung cancer or those who developed pneumonitis due to anti-cancer therapy. Moreover, radiological manifestations of COVID-19 are not specific and could be shared with other types of infections and inflammatory processes [14, 28-34].

With this complexity, it is reasonable to suggest that patients with cancer, particularly lung cancer, should undergo testing for COVID-19 whenever they have any clinical symptoms suggestive of infection. Furthermore, with the clinical aggressiveness observed in lung cancer, therapy may not be postponed [14].

Searching the right approach, from outpatient to inpatient management:

Responses and actions are evolving rapidly throughout the COVID-19 pandemic.

Hemato-oncologists should follow the guidelines and latest updates recommended by the Ministry of Health, and most importantly, engaging them in their plans.

At a time in which the risk of COVID-19 infections is high and there is a burden on the health-care system and an inability to deliver the routine care, actions should be taken according to the presence or absence of threat by COVID-19 locally [11, 17].

-Information for patients

The impact of the COVID-19 pandemic on cancer patients and their families is huge and distressing. Oncologists and hematologists should clearly explain to cancer patients their vulnerability to getting the infection, the consequences of this global pandemic on their health, and the risks of therapy modifications. In addition, telemedicine (including phone calls and internet-based communications) should be used to contact patients or their caregivers regarding home-administration of treatment, counseling, adverse effects of medications, or other medical issues that may arise [10].

-Outpatient care

Given the susceptibility of patients with cancer to SARS-CoV-2 infection, their presence at hospitals should be minimised [35]. Certain measures should be taken to encourage cancer patients to stay at home if applicable and teach them how to protect themselves while they are at home with their families.

Cancer patients who have close family members with confirmed or suspected COVID-19 infection should always be isolated away from these members and should contact their clinician for further engagement in the steps necessary to reduce the possibility of being infected by COVID-19. In the same way, clinicians should inform these patients about the symptoms of this disease and when and how to seek medical advice, emphasizing the importance of contacting their primary clinician just before going to the emergency department and having the assessment done in an isolated room. The medical staff must take a comprehensive medical history from the patients and work according to the latest guidelines. Also, medical staff must keep in mind

the wide differential diagnosis of fever in cancer patients, including drug-related fever, bacterial infections, fungal infections or viral infections which are not limited to COVID-19 [36].

Health-care systems and clinicians must be aware that certain measures should be implemented in diagnosing cancer patients during this pandemic. For example, assessment of COVID-19 infection should not be done in communal places where suspected cancer patients are gathered with others in one place. For patients who have met the scoring system criteria for COVID-19 (Table 1), testing should be done, while lung cancer patients who have fever or any new respiratory symptoms have to be tested regardless of the scoring systems [14]. During this pandemic, cancer patients should inform their health-care providers about their clinical history, as well as have their primary clinician's phone number at hand for continuous updates about their clinical status.

Table (1): Indicators for COVID-19 infection.

Indicator	Point*
Fever above 38.5 C	1
Sever or progressive dry cough	1
Influenza symptoms (runny nose, sore throat)	1
Recent travel within 14 days to an infected area or close contact with a person returning from travel	2
Close contact with a confirmed case	3
A family member or friend having influenza, dry cough or fever	1
Health-care workers	1

* COVID-19 infection suspicion score is calculated by summation of total points beside each indicator; if the total points are less than 3: low possibility, 3-5: suspected, above 5: highly suspected.

For outpatient care management, health-care workers are advised to do phone calls

with cancer patients planned to present to the hospital the next day, in order to ensure these patients do not have symptoms compatible with COVID-19 infection. In outpatient clinic, chemotherapy centers should be open-space, have mobile walls between seats, and all patients and staff must wear face masks [11, 35].

The risk of transmitting COVID-19 could be decreased through infection control policies applied in the hospital. It is mandatory for all staff in a health institution to be screened at every entry to the hospital, as well as designing the flow of patients to minimize contact between them.

Controlling and evaluating COVID-19 infection during hospitalization

Hospital admission for the vast majority of cancer patients is an indispensable step in the oncology treatment path. It is necessary for managing chemotherapy complications, monitoring disease progression and administration of aggressive therapy for some cancer types (such as hematologic malignancies, in which close observation of patients during active therapy is mandatory) [37]. The concern is more substantial if the patients are elderly or have multiple medical conditions which require greater attention [38]. A previous cohort analysis described the characteristics of admitted cancer patients and the reasons for admission [37]. The results showed that the median hospitalization time was 9 days and patients with lung cancer were the second most frequently admitted patients [37]. Moreover, cancer therapy and diagnosis were found to form about 20% of hospital admissions, whereas the rest of admissions were due to uncontrolled symptoms [37].

In hospital, the appropriate methods for managing the COVID-19 pandemic are limiting the number of hospital entry points and restricting emergency visits for urgent cases. These can be achieved by deploying a triage tent at the main emergency entrance for evaluating the emergent of hospital visits. Also, at each entry point, full assessment regarding COVID-19 infection suspicion and indicators for all patients, visitors, health-care professionals and other workers should be safely applied (Table 1). After that, suspected cases of COVID-19 infection must be properly isolated and tested for confirmation. If the

COVID-19 PCR test is positive then the patient has to be handled according to the CDC and WHO updated guidelines [39, 40]. In case of precluding the infection, assessment of the

need for quarantine should be undertaken, especially if the patient has recently been exposed to a confirmed infected case, or his/her COVID-19 infection suspicion score is equal or above 3 (Figure 1).

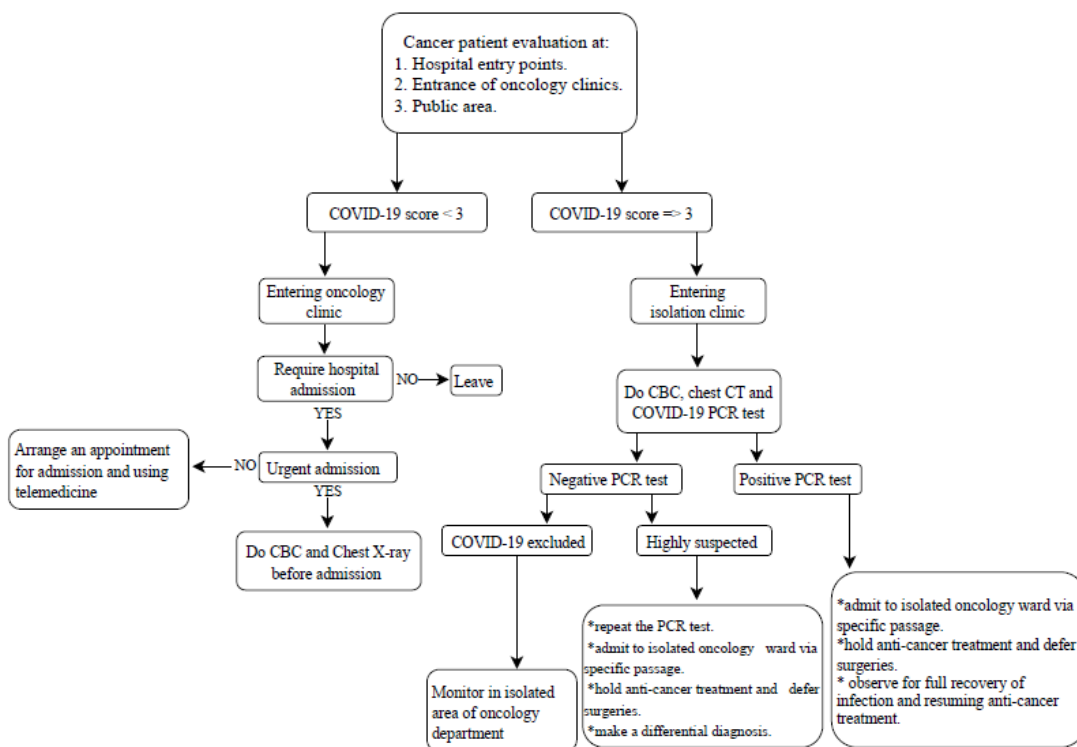


Figure (1): Scheme for cancer patients' hospitalization process. CBC: complete blood count, CT: computed tomography.

Anti-cancer treatment during COVID-19 pandemic: strategies and recommendations

As reported in many studies, patients with hematologic or non-hematologic malignancies are at high risk for infection with novel coronavirus disease (COVID-19) as well as other infections [24, 41-43]. These patients may also have worse clinical outcomes if they get infected with COVID-19 compared to those who have no comorbid conditions [42]. A recent analysis in China reported that thirty-nine percent of oncology patients with COVID-19 died or were entered into the critical care unit [42]. Specifically, it seems that COVID-19 attacks patients with lung cancer more prominently than other malignancies, which necessitates additional strict measures in these patients [24].

A reason behind that is the cytotoxic medications that are given to cancer patients, which cause immunosuppression in the form

of neutropenia for many of them [44]. The epidemic analysis in China showed that patients who were recently exposed to chemotherapeutic agents or procedures are at greater risk for severe illness with COVID-19 [42]. This is in addition to the disease process itself, such as leukemia and multiple myeloma, that can impair immune system functions [45].

Furthermore, numerous cancer patients use other immunosuppressive agents such as corticosteroids, which are part of some chemotherapy regimens and are frequently given as premedication. These corticosteroids will increase the risk of infections, including infection of the lower respiratory system [46, 47]. Therefore, it is important to use the lowest possible therapeutic dose with minimal duration, and to be given once a day in the morning, or dosed every other day if applicable, to reduce corticosteroid adverse effects [48].

Our goals are to decrease the exposure of cancer patients to hospitals and clinics and maintain the functioning of their immune system whenever possible. These goals can be achieved by composing effective strategies and developing policies to cope with this pandemic according to the local means and availability of materials.

One of the suggested strategies to decrease the risk of neutropenia in cancer patients is to give prophylactic granulocyte colony stimulating factor (G-CSF), especially when the chemotherapy session can't be delayed or cytotoxic drugs' dose should not be reduced [49]. Indeed, one may consider administering prophylactic G-CSF with chemotherapy protocols that are associated with febrile neutropenia in 10-20% of patients, taking into consideration other factors such as health cost burden and adverse effects of G-CSF [49, 50].

Another strategy is to postpone the initiation of the chemotherapy phase (especially in the adjuvant setting) in newly diagnosed patients for an acceptable period of time and without affecting the desired outcomes [42]. For example, in patients with stage I, II, and III breast cancer, adjuvant chemotherapy regimens can be deferred up to 90 days after surgery without influencing the overall survival, but more than 90 days of deferral is not advisable [51, 52].

Choosing alternative chemotherapy protocols with similar efficacy is one of the most powerful strategies to cope with global shortages of chemotherapeutic medications [53]. This strategy can also be used wisely to overcome the increased hospital visits and contact time with health-care professionals required due to frequent dosing of some chemotherapy protocols. For example, in platinum-resistant recurrent epithelial ovarian cancer, administration of doxorubicin in its liposomal formulation every 28 days could be chosen instead of topotecan (given in the first 5 days of each 21 days cycle), considering both regimens have the same therapeutic outcomes with regard to survival and response [54, 55].

Another way to deal with the COVID-19 pandemic in oncology patients is to administer cytotoxic medications at home. This can re-

duce the need for hospital admissions and subsequently prevent hospital-related infections. For example, using a disposable pump at home to deliver fluorouracil (which is a part of FOLFOX and FOLFIRI protocols) in place of continuous infusion at hospital in patients with colorectal cancer [56].

Choosing the appropriate route of administration for chemotherapeutic agents without compromising the desired goals should also be considered. In practice, we can use a per os capecitabine-based regimen for rectal cancer and other gastrointestinal malignancies with intent to cure the disease instead of fluorouracil infusion [57]. In addition, subcutaneous bortezomib for patients with multiple myeloma can be safely administered at home, which has comparable efficacy to intravenous bortezomib [58, 59].

Finally, confirmed or suspected cases of COVID-19 among cancer patients should immediately be withheld from chemotherapy, and resume it later after achieving a full recovery from infection according to the patient's clinical status and laboratory tests [5].

Table 2 summarizes the strategies for cancer patients with active anti-cancer treatment during the COVID-19 pandemic.

Table (2): Summary of the strategies for cancer patients with active anti-cancer treatment during COVID-19 pandemic.

Suggested ways to decrease the risk of COVID-19 infection in cancer patient during active anti-cancer treatment.
*Suggesting prophylactic G-CSF.
*Delaying anticancer therapy if appropriate.
*Using alternative therapeutic options.
*Delivering chemotherapy at home.
* Using alternative routes of administration.

Guidance to cope with global shortages of anti-cancer drugs

Oncology departments in healthcare institutions should prepare short-term and long-term plans to face the global shortages of chemotherapeutic medications and personal protective equipment (PPE). Chemotherapeutic medications took the lead among medication shortages in 2010, and the Food and Drug

Administration is continuously updating the drug shortages status [60, 61]. The shortages in the supply of cytotoxic medications require local oncology departments, in collaboration with health-care professionals (doctors, pharmacists and nurses), to utilize alternative therapeutic options, use substitutional chemotherapy protocols, and prioritize patients with high risk diseases [62]. These strategies can be applied in some cases. But, in other cases, delaying chemotherapy sessions, administering insufficient doses, or using substitutional regimens are not appropriate and may have a negative impact on patients' lives [63, 64], i.e. the drug, cytosine arabinoside (Ara-C) is considered as a mainstay of therapy in patients with acute myelogenous leukemia [65].

Therefore, institutions should have information about causes beyond the lack of supply and the time period of medication shortages by maintaining continuous contact with suppliers and manufacturers, to be able to make strategic steps towards addressing this problem [5, 53]. Also, oncology departments should thoroughly analyze the availability of medications (especially currently scarce medications and medications that possibly will be in shortages) in its pharmacy stocks and for how long the current inventory will last [53]. Furthermore, collaboration between local oncology departments to cover the gap of short supply should be attempted [53].

In pharmacy departments, following the instructions regarding chemotherapeutic products' stability after dilution or opening of vials should be taken into consideration. Some products may have a longer stability time when they are diluted at different concentrations (such as etoposide) or stored at different temperatures [66]. For example, the vial stability of asparaginase E.coli after reconstitution is 3 hours at room temperature compared to 72 hours if the vial stored in a refrigerator [66]. On the other hand, some products may have a short-time stability and the remaining vial content must be discarded after opening [66]. Therefore, following products' stability guidance can help preserve the remaining vial content and share it between patients whenever possible by arranging dates for patient's attendance to their sessions taking into consideration infection control protocols during chemotherapy preparation.

Treating cancer patients with COVID-19 infection

Many studies have established the risk factors associated with increased mortality rate in COVID-19 patients. Of those, age, a higher sequential organ failure assessment (SOFA) score and comorbidities appear to have significant effect [67-69]. However, some laboratory findings linked with adverse outcomes in COVID-19 patients are usually present in patients with cancer, such as lymphopenia, high D-dimer and lactate dehydrogenase, thus the interpretation of these findings in cancer patients should be done with caution [69-71]. Nevertheless, the published data about oncology patients infected with COVID-19 showed a higher incidence of complications including ICU admission, invasive ventilation and death [24].

Besides age and comorbidities, the cancer patients most vulnerable for the development of complications are patients who receive active chemotherapy, immunotherapy or radiotherapy for lung cancer, in addition to patients who have had bone marrow transplants within the last 6 months, or who are still taking immunosuppressive drugs [6, 72]. Nonetheless, criteria for hospitalization should still be followed. In patients with those additional risk factors, the prognosis appears worrisome, and frank discussions with the patients and their families should be done thoroughly [11]. On the other hand, in cancer patients with no active disease, and who are no longer on immunosuppression therapy, the regimen to treat COVID-19 should be followed as the general population [7].

Treating cancer patients with COVID-19 should be individualized, and depends on the above-mentioned characteristics. Cancer patients with COVID-19 should be transferred to a COVID-19 admission area, while the main oncology department should not admit any case of COVID-19 if possible [10].

Special considerations

Transfusion considerations

Shortages of blood products will arise during the pandemic from constraints on health-care capacities as a result of the influx of COVID-19 patients to the hospital and the societal effects on donation. The optimal

threshold for outpatients' transfusion of patients with haematological malignancies has not been established yet [73]. On the contrary, restriction of transfusion may be inappropriate in patients with cardiovascular disease [74]. However, erythropoietin, folic acid, iron and vitamin B12 may serve as an appropriate substitute that should be considered to limit transfusion requirements.

Shortages of platelet products will be noticed early on, as platelets have the shortest half-life among blood cells. According to the latest guidelines, there is no rule to transfuse platelets prophylactically in asymptomatic patients with chronic bone marrow failure or for clinically stable patients without bleeding after autologous bone marrow transplantation [75].

Overall, during the threat of shortages in blood products, clinicians have to consider those at highest risk of bleeding and red cell requirements, and provide alternative solutions as deemed appropriate. Also, the facility has to preserve sufficient levels of donation of blood products by encouraging the population to donate and preparing safety steps to reduce donors' contact time outside the home. This may be accomplished by using telecommunication to arrange the donation time. Additionally, the workers in their health-care institutions themselves can be considered for donation [5].

Surgery for cancer patients

During the current pandemic, hospitals are facing difficult decisions on how to reallocate its resources, beds, ICU capacities, blood products and the needed PPE. Although nothing can replace judgments on the ground, it has been generally advised to avoid all unnecessary surgeries. The intention behind that is to help institutions where community spread of COVID-19 is deemed high [41, 76]

Along those lines, elective surgeries that pose a high chance of long postoperative ICU admission and utilization of ventilators are advised to be delayed. Such cases need to be evaluated on a regular basis based on local circumstances, and the availability of non-surgical therapies [41].

Multidisciplinary team discussion is highly recommended for non-urgent surgeries, and patients should be informed about the pros and cons depending on local resources, tumor characteristics and expected outcomes upon delay. However, the extent of this delay could vary depending on the current threat by the infection.

Bone marrow transplant (BMT) in cancer patients

Patients who are undergoing bone marrow transplantation will be at greater risk of infections during and after transplantation [77]. Of these, lower respiratory tract infections are considered one of the most common infections among these patients, including viral infections [78].

In BMT patients, neutropenia will last about 5-30 days after transplantation, which requires the BMT unit to follow strict measures in an attempt to decrease infection risk and keep the environment clean by fully adhering to standard infection control principles and regulations [79, 80]. Moreover, non-myeloablative conditioning regimens could be used to minimize the duration of neutropenia [79].

Clinical assessment, history taking, and laboratory tests (including tests for respiratory viral infections) should be done, and in the case of confirmed respiratory tract infections before BMT, treated accordingly [81]. Cases with COVID-19 infection should be isolated in a separated room with neutral environmental pressure. The BMT should be delayed for 90 days if the patient presented with low-risk disease, or until the COVID-19 PCR test is negative for three consecutive weeks with complete resolution of symptoms for high-risk disease [9]. BMT should also be postponed for 2-3 weeks (from the last contact) in case of contact with COVID-19 patients, and frequent laboratory tests for monitoring COVID-19 infection are recommended [9].

CONCLUSIONS

Until now, there is no definitive treatment for COVID-19, which has been spreading rapidly worldwide since the beginning of 2020, with variations in the rates of mortality and infection between countries. This may be due to factors like infection control measures taken,

health-care system capacity, early preparation and implementation of guidelines and the biological structure of populations, which may differ between continents and even countries.

Many researchers reported an increased risk of COVID-19 infection among cancer patients and noted a higher mortality rate compared to the public [24, 41, 42]. Cancer services are not on the frontline of the coronavirus pandemic, but do have a major role to play, and this must be well-planned. In response to the pressures on the health-care system, the expected lack of adequate health-care infrastructure and human resources, supply disruption and fear among patients and health-care workers, the elective component of our work may be lessened. However, cancer services will need to continue to deliver care. Therefore, we should seek the best local solutions to continue offering proper management, while protecting resources, patients and staff. In this article and based on the latest clinical research, we discussed the risk of getting infected with COVID-19 among cancer patients, and we tried to manage every step involved in their treatment, rather than offering definitive guidance, taking into consideration the safety measures among endemic areas of COVID-19. The general recommendations for cancer patients during COVID-19 pandemic as following. First, it is imperative for competent authorities to take proactive steps in increasing the general health awareness about the risk of COVID-19 infection in cancer patients, and implementing rules that would decrease the risk of its transmission. Second, clinicians should explain honestly to cancer patients the risk of COVID-19 infection versus the risks of treatment modifications. Also, health-care providers have to continuously stay up to date with the newest information about COVID-19 infection in cancer patients and recommendations. Third, health-care institutions (including oncology departments) should follow a comprehensive guidance plan to face this pandemic, focusing on the creation of local guidelines, as the epidemic status and the local possibilities may significantly differ between different areas. Finally, extreme precautions should be taken for cancer patients in case of easing the lockdown and reopening businesses by following strict infection control measures.

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