



# Indian Expert Opinion on Cancer Care during COVID-19 Pandemic

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## Abstract



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Coronavirus pandemic has increased human disease burden, as well as economic distress globally. Being in an immunocompromised state, patients with cancer comprise an important at-risk population for novel coronavirus disease 2019 (COVID-19) infection. It is necessary to modify individualized clinical management for every cancer patient in the context of the ongoing COVID-19 pandemic. Simultaneously, additional safety precautions for the cancer care providers are mandatory. This review will provide general recommendations in the Indian context optimizing the same.

## Keywords

India, oncology management, recommendations, patient safety

## Introduction

Public health is facing an unprecedented crisis as 7,390,702 confirmed cases of novel coronavirus disease 2019 (COVID-19), including 417,731 deaths, have been reported globally as of June 12, 2020.<sup>1</sup> Corresponding figures for India are 289,036 cases and 8,498 deaths, indicating that Indians might have a lower mortality.<sup>2,3</sup>

There is limited published data related to COVID-19 and cancer patients. China reported that patients with cancer had a

two-fold higher chance of COVID-19 infection, several comorbid conditions (diabetes, cardiovascular diseases, and hypertension) elevating the risk.<sup>4,5</sup> Another case series from Wuhan, China, showed that patients who received latest antitumor therapy within 2 weeks of COVID-19 diagnosis were more prone to develop severe events.<sup>6</sup> Meta-analysis of 11 studies suggested that of all patients infected with COVID-19, 2.0% had underlying cancer (95% confidence interval [CI]: 2.0–3.0%;  $I^2 = 83.2\%$ ).<sup>7</sup> The Indian Council of Medical Research (ICMR)'s laboratory surveillance for COVID-19 showed that among the

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positive cases ( $n = 40,184$ ), 25.3% were asymptomatic family contacts and 10.6% were symptomatic contacts.<sup>8</sup> These numbers are likely to increase and hence, India-specific cancer guidelines is the need of the hour.

## Methods

A group of nine Indian subject experts (medical, surgical, radiation, and hemato oncologists) met virtually (video conference) to discuss available data, personal experience, and developed the consensus review document. The draft was circulated electronically, inputs obtained and modified as appropriate, till the final document was approved by all authors.

## Risk Factors

It is estimated that excess cancer deaths during COVID-19 pandemic are likely to be 6,270 in England and 33,890 in the United States.<sup>9</sup> Individuals at higher risk of COVID-19 infection and associated mortality among cancer cohort are summarized in [►Fig. 1](#).<sup>10</sup>

## Practical Challenges and General Recommendations during COVID-19 Pandemic

The practical challenges faced by Indian oncology community and cancer hospitals are numerous.<sup>11,13</sup>

Several important ones are described in [►Table 1](#). Testing for COVID-19 among cancer patients should follow a triage system including thermal screening at point of entry, evaluation of susceptibility, and appropriate segregation between COVID-19 designated and non-COVID-19 healthcare facilities ([►Fig. 2](#)).<sup>13,14</sup> The committee recommended nonsymptomatic (for COVID-19) patients to receive

daycare treatment on the same day (without waiting for results of COVID-19 tests). The committee's opinion was that it was not feasible to do reverse-transcription polymerase chain reaction (RT-PCR) severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) testing for all cancer patients in India,<sup>14</sup> limiting its application only to patients undergoing aerosol-generating procedure or those with symptoms suggestive of COVID-19 infection (such as fever, coughing, sore throat, difficulty in breathing, muscle pain, tiredness, anosmia, and dysgeusia). A separate set of recommendations should be developed by each hospital for X-ray, computed tomography (CT), pulmonary function tests, and other biological tests. All cancer patients must be told to follow prevailing government regulations against COVID-19 (including World Health Organization recommendations).<sup>15</sup>

## Cancer Patients' Treatment Decision and Prioritization

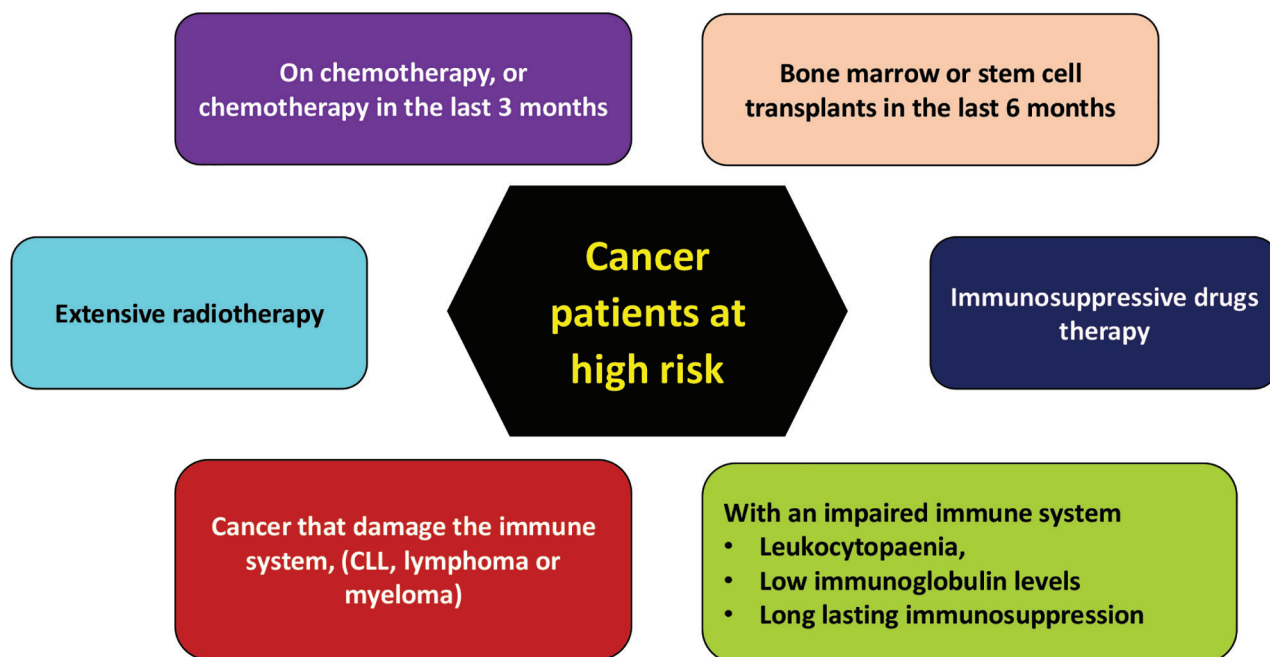
Management of individual cancer patients should be prioritized based on their risk category.<sup>14</sup>

**High priority:** life-threatening condition, clinically unstable, and/or the benefit justifies high-priority intervention (significant overall survival gain and/or substantial improvement in quality of life [QoL]). Should continue receiving standard of care as before.

**Medium priority:** noncritical. Delay in definitive therapy by up to 6 weeks may be permitted as appropriate without change in overall outcome.

**Low priority:** stable. Temporarily delay anticancer management for the duration of the COVID-19 pandemic, provided there is no or low impact on survival benefit or QoL.<sup>14</sup>

Hospital visits and elective admissions should be minimized. Noncritical elective surgical procedures, adjuvant/neoadjuvant chemotherapy, and/or radiotherapy

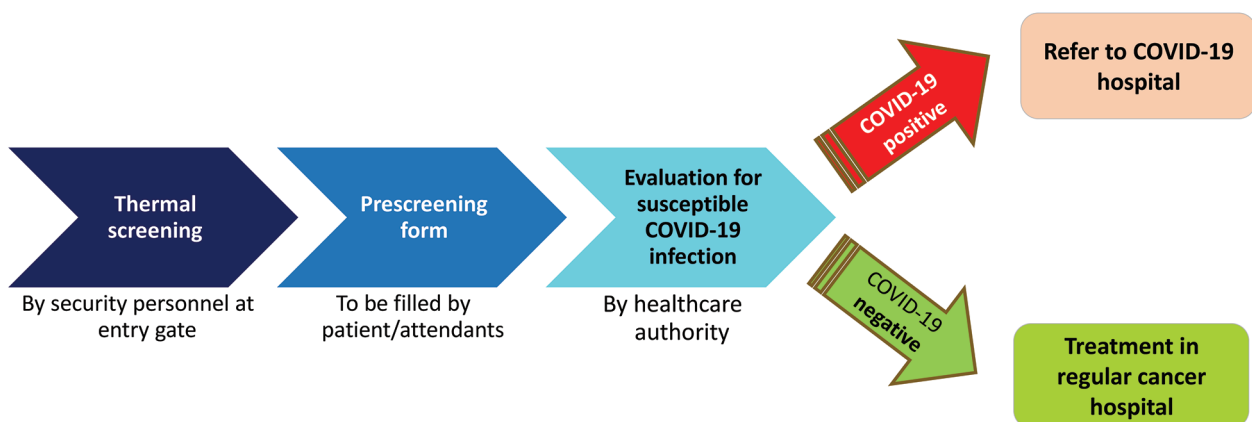


**Fig. 1** Individuals at high risk of COVID-19 infection and associated mortality among cancer cohort. CLL, chronic lymphocytic leukemia; COVID-19, novel coronavirus disease 2019.

**Table 1** Practical challenges during COVID-19 pandemic

Practical challenges during COVID-19 pandemic: meeting discussions
Patient perspective
<ul style="list-style-type: none"> <li>• Management of patients from remote areas where there are no cancer hospitals or cancer hospitals with limited treatment facilities</li> <li>• Impact of lockdown on local, intra and interstate travel resulting in non-approachable accessibility of the treatment facilities by many cancer patients from rural areas</li> <li>• Under the scenario of severe resource constraints, treatment might only be possible in oncological emergencies</li> </ul>
Healthcare infrastructure perspective
<ul style="list-style-type: none"> <li>• Potential shortage of personal protective equipments, such as masks, gowns, and gloves</li> <li>• Potential shortage of hospital beds, intensive care unit beds, and ventilators</li> <li>• Inability to maximize social distancing among our patients, colleagues, and staff due to humongous patient load in outpatient departments and space constraint</li> <li>• Human resource constraints: potential shortage of hospital personnel due to sickness, quarantine, and duties at home</li> <li>• Nononcology COVID-19 cases can potentially overburden current health-system capacity in the near future</li> </ul>

Abbreviation: COVID-19, novel coronavirus disease 2019.



**Fig. 2** Triage system for screening of cancer patients.

may be postponed temporarily (if feasible) based on local COVID-19 circumstances. Where treatment is to be initiated or continued, strict adherence to the COVID-19 prevention and screening strategy is mandatory. When the cancer patient is suspected or confirmed to have the COVID-19 infection, management needs to be individualized (→ Fig. 3).<sup>16</sup>

A multidisciplinary tumor board should decide whether patient has indolent/early stage disease where wait and watch policy is appropriate, whether intravenous therapies can be temporarily replaced with oral therapies, whether adjuvant therapy can allow postponement of definitive surgery, whether palliative therapy can be delayed/postponed/avoided, or whether routine follow-up visits can be postponed for asymptomatic patients who have completed their anti cancer treatment.(→ Fig. 4)<sup>14,16</sup> Treatment of cancer patients must not be postponed indefinitely. Remote monitoring using telemedicine should be used wherever possible. Instructions should be given to allow investigations (e.g., CBC, blood biochemistry, and CT scan)

and procurement of oral medication (prescriptions) closer to home. No emergency treatment (chemotherapy, radiation therapy, or surgery) should be denied. Intensive treatment like planned allogeneic stem-cell transplantations can be delayed where disease control can be achieved with alternative treatment methods.<sup>14</sup> The National Institute for Health and Care Excellence (NICE) guidelines provide recommendations for prioritizing systemic anticancer therapy, radiotherapy treatments, and hematopoietic stem-cell transplantation as shown in →Table 2.<sup>17-20</sup>

At all times, protection of the cancer care providers must be diligently followed as per prevailing regulations and standard operating procedures (SOPs).<sup>14,21</sup>

**Responsibilities of Oncologists and the Oncology Community**

Disruption in routine oncology services should be minimized. Awareness and screening programs should continue with the addition of education and implementation of preventive

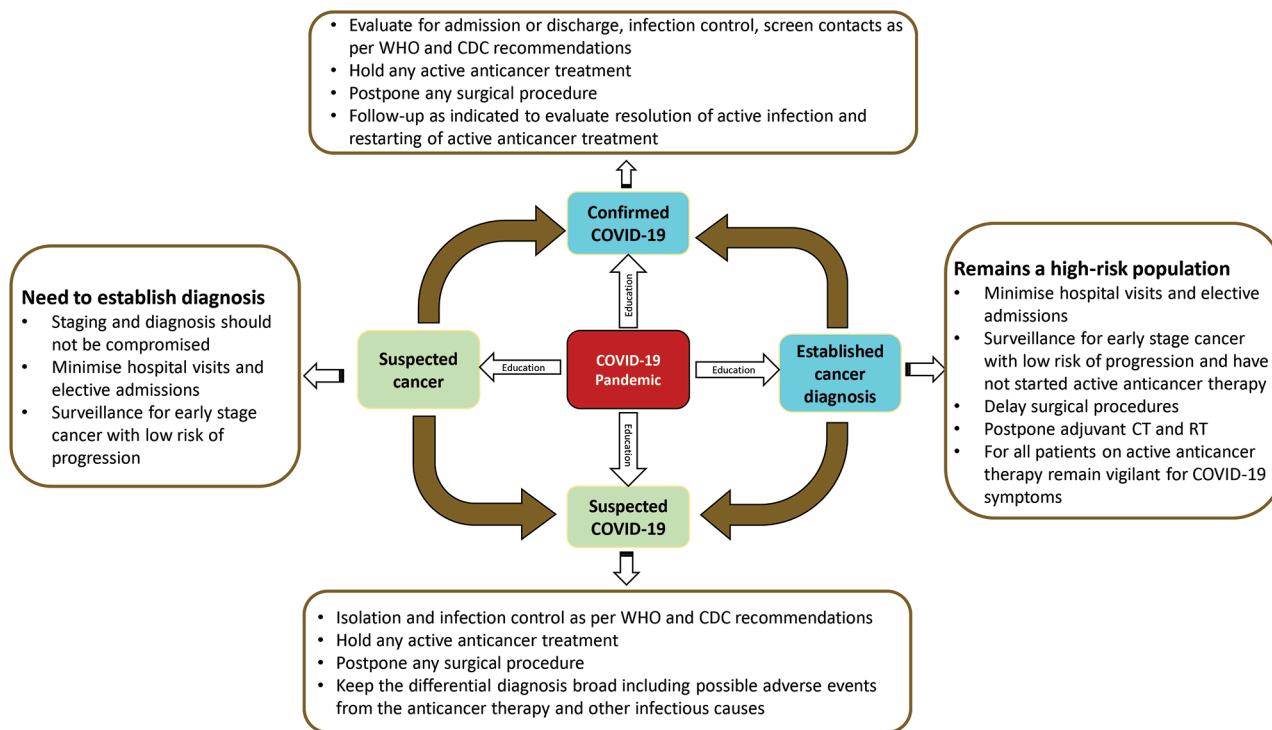


Fig. 3 Practical approach to the management of cancer patients during COVID-19 pandemic (Adapted from: Al-Shamsi et al).<sup>16</sup> CDC, Centers for Disease Control and Prevention; COVID-19, novel coronavirus disease 2019; CT, chemotherapy; RT, radiotherapy; WHO, World Health Organization.

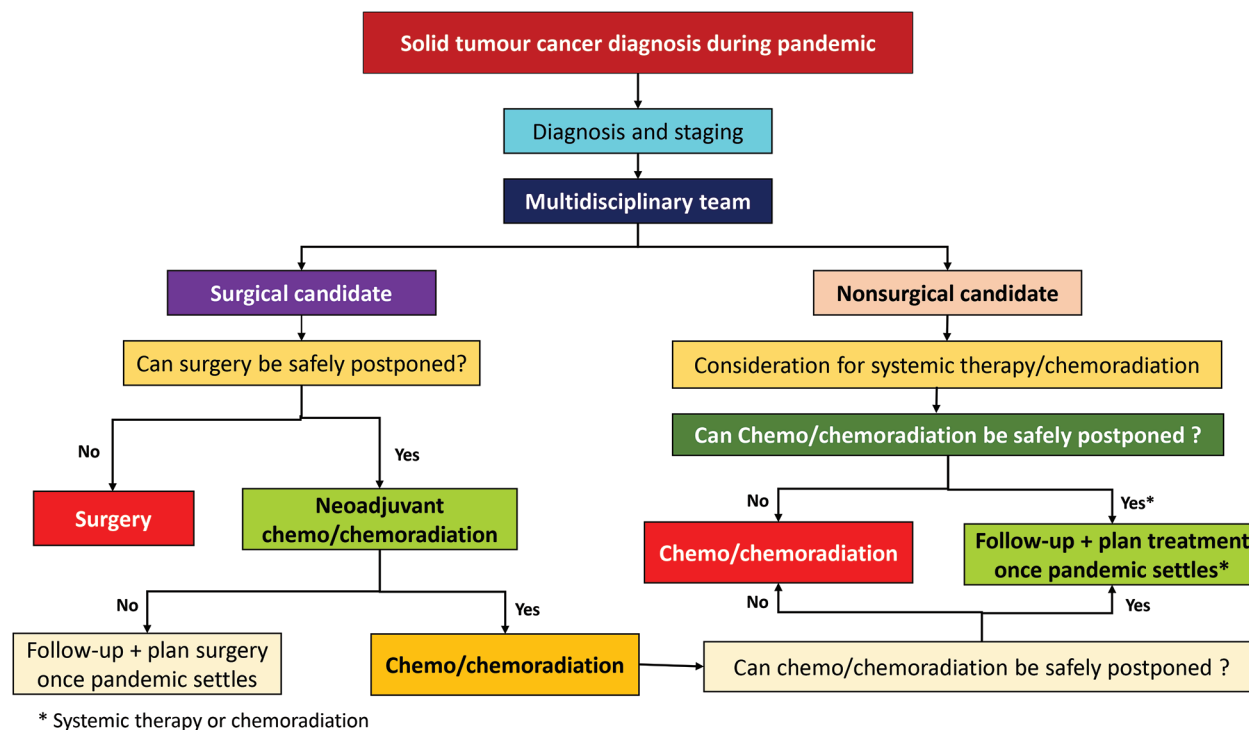


Fig. 4 Management of solid tumors during COVID-19 pandemic (Adapted from: Al-Shamsi et al).<sup>16</sup>

measures against COVID-19. Scarce resources should be reallocated if necessary to maximize health benefits. The American Society of Clinical Oncology (ASCO) also recommends that oncologists should communicate the new plan to their patients with compassion and honesty.<sup>22</sup> Psychological

support should be offered where necessary; COVID-19 adding to the emotional distress, anxiety, feeling of despair, and fear of death commonly experienced by cancer patients. Patients might have concerns about uncertainty of receiving their cancer treatment on time, delay in life-saving treatments due

**Table 2** Prioritizing systemic anticancer treatments, radiotherapy treatments, and hematopoietic stem-cell transplantation (NICE guidelines)

Priority level	Systemic anticancer treatments <sup>17</sup>	Radiotherapy treatments <sup>18</sup>	Hematopoietic stem-cell transplantation <sup>19</sup>
1	Curative treatment with a high (more than 50%) chance of success Adjuvant or neoadjuvant treatment which adds at least 50% chance of cure to surgery or radiotherapy alone or treatment given at relapse	Radical radiotherapy or chemoradiotherapy with curative intent, if: <ul style="list-style-type: none"> <li>• The patient has a category 1 (rapidly proliferating) tumor</li> <li>• Treatment has already started</li> <li>• There is little or no possibility of compensating for treatment gaps</li> </ul> External beam radiotherapy with subsequent brachytherapy, if: <ul style="list-style-type: none"> <li>• The patient has a category 1 (rapidly proliferating) tumor</li> <li>• External beam radiotherapy has already started</li> </ul> Radiotherapy that has not started yet, if: <ul style="list-style-type: none"> <li>• The patient has a category 1 (rapidly proliferating) tumor</li> <li>• They would normally start treatment, based on clinical need or current cancer treatment waiting times</li> </ul>	Urgent allogeneic HSCT where delaying the procedure presents a high risk of disease progression, morbidity, or mortality
2	Curative treatment with an intermediate (20–50%) chance of success adjuvant or neoadjuvant treatment which adds 20 to 50% chance of cure to surgery or radiotherapy alone or treatment given at relapse	Urgent palliative radiotherapy, for patients with malignant spinal cord compression who have salvageable neurological function	High-grade lymphomas and other urgent cases needing autologous HSCT for curative intent (e.g., diffuse large B-cell lymphoma and Hodgkin's lymphomas)
3	Curative treatment with a low (10–20%) chance of success Adjuvant or neoadjuvant treatment which adds 10–20% chance of cure to surgery or radiotherapy alone or treatment given at relapse Noncurative treatment with a high (more than 50%) chance of more than 1-year extension to life	Radical radiotherapy for a category 2 (less aggressive) tumor, if radiotherapy is the first treatment with curative intent. Postoperative radiotherapy, if: <ul style="list-style-type: none"> <li>• The patient has a tumor with aggressive biology or</li> <li>• They have had surgery, but there is known residual disease</li> </ul>	Chronic conditions including most non-malignant indications and low-risk malignant indications for allogeneic HSCT (most should be deferred until the risks associated with the COVID-19 pandemic have passed)
4	Curative treatment with a very low (0–10%) chance of success Adjuvant or neoadjuvant treatment which adds less than 10% chance of cure to surgery or radiotherapy alone or treatment given at relapse Noncurative treatment with an intermediate (15–50%) chance of more than 1-year extension to life	Palliative radiotherapy, where improving symptoms would reduce the need for other interventions	Allogeneic HSCT recipients with a relatively low predicted survival (e.g., 20–30% at 5 years based on pre-HSCT characteristics; all but exceptional cases should be deferred until the risks associated with the COVID-19 pandemic have passed)
5	Noncurative treatment with a high (more than 50%) chance of palliation or temporary tumor control and less than 1-year expected extension to life	Adjuvant radiotherapy, if: <ul style="list-style-type: none"> <li>• The disease has been completely resected</li> <li>• There is a less than 20% risk of local recurrence at 10 years</li> </ul> Radical radiotherapy for prostate cancer, in patients having neoadjuvant hormone therapy	Autologous HSCT for myeloma, low-grade lymphoproliferative diseases, and nonmalignant indications (all but exceptional cases should be deferred until the risks associated with the COVID-19 pandemic have passed)
6	Noncurative treatment with an intermediate (15–50%) chance of palliation or temporary tumor control and less than 1-year expected extension to life	NIL	NIL

Abbreviations: COVID-19, novel coronavirus disease 2019; HSCT, hematopoietic stem-cell transplantation; NICE, National Institute for Health and Care Excellence.

to lockdown restrictions, social distancing reducing family support, risk of getting COVID-19 infection while in hospitals, and subsequent effect on their survival outcomes. While

clinical trials are important, they will lose priority in the fight against the COVID-19 pandemic. Patients being consented for or already ongoing on clinical studies might need SOPs to be

modified to make participation more patient friendly without compromising on the integrity of the study protocol.<sup>23-27</sup>

Based on the ASCO suggestions, the committee recommended to (1) keep participants informed about changes to trials and their care and remind participants to alert their research team about changes to their health; (2) develop formal COVID-19 standard operating procedures for clinical trials; (3) promote telehealth virtual visits for patients; (4) implement all aspects of patient review through patient portal, email, phone, video; (5) use remote safety laboratory testing, where feasible; and (6) shipment of oral study medication directly to patients.<sup>23</sup>

### Cancer-Specific Recommendations in the Indian Context

According to Globocan 2018 data, the five most common cancers in India are breast cancer (14%), oral cavity cancer (10.4%), cervix uteri (8.4%), lung cancer (5.9%), and stomach cancer (5%). Other cancers such as head and neck cancers, prostate cancer, colorectal cancer, leukemias, and lymphomas also significantly contribute to the cancer burden of India.<sup>28</sup> Several global organizations have published guidelines for the management of cancer patients during this COVID-19 pandemic. This committee has recommended their adoption in the Indian settings with appropriate modifications.

#### Breast Cancer

Surgical oncology high priority includes patients who have completed neoadjuvant chemotherapy or who have progressive disease during neoadjuvant treatment, patients with breast abscess who cannot be drained at bedside, and patients whose diagnostic dilemma requires excisional biopsy. For patients with invasive cancer or those who are pregnant, a multidisciplinary tumor board will need to take individualized decision based on the risk benefit of surgery versus other modalities of treatment. Medium priority should be assigned to patients with clinically low-risk primary breast cancer (e.g., stage I/II estrogen receptor [ER]-positive/progesterone receptor [PR]-positive/human epidermal growth factor receptor 2 (HER2)-negative, and low-grade/low proliferative index tumors). They can be commenced on neoadjuvant/preoperative endocrine therapy (according to menopausal status) and definitive surgery delayed. For patients with triple-negative breast cancer or HER2-positive disease, neoadjuvant chemotherapy or HER2-targeted treatment is recommended. Low priority shall include patients with benign lesions (fibroadenomas, atypia, and papillomas), those opting for prophylactic surgery (e.g., asymptomatic with risk of hereditary cancers) and those requiring high-risk procedures (e.g., reconstruction after mastectomy). Patients with ER + ductal carcinoma in situ (DCIS) also fall in this category and their surgery may be delayed until the COVID-19 pandemic settles down. For patients with malignant phyllodes or sarcomas, decision regarding surgery needs to be individualized.<sup>29-31</sup>

Radiation oncology of high priority includes patients requiring palliative treatment for bleeding/painful inoperable

breast mass; for adjuvant postoperative radiotherapy in high-risk breast cancer patients (inflammatory disease at diagnosis, node-positive disease, triple-negative breast cancer, HER2-positive breast cancer, residual disease at surgery, and age <40 years). Medium priority should be assigned for adjuvant postoperative radiotherapy in patients with low-/intermediate-risk breast cancer (age: 40–65 years, stage I/II luminal cancer, ER-positive, regardless of nodal status or positive margins). Use of hypofractionated regimens should be considered to reduce hospital visits. Endocrine therapy may be started during the waiting interval. Low priority patients are those with low-risk breast cancer (age: >70 years, low-risk stage I, and ER-positive/HER2-negative breast cancer). Adjuvant endocrine therapy can be commenced while postponing radiotherapy. Locally advanced HR-negative cases may be offered neoadjuvant chemotherapy.<sup>30</sup>

In medical oncology, oral endocrine agents, such as tamoxifen and aromatase inhibitors, can be safely continued. Patients progressing on neoadjuvant therapy should be referred to surgery, radiation, or given second-line systemic therapy. Patients with clinical anatomic stage 1 or 2 ER-positive/HER-negative should be administered neoadjuvant endocrine therapy surgery postponed for 6 to 12 months. Aromatase inhibitors should be preferred over tamoxifen for neoadjuvant endocrine therapy. The addition of oral-targeted agents to endocrine therapy may be delayed in first-line therapy or in situations where endocrine therapy alone is providing effective tumor control. Administration of granulocyte colony-stimulating factor (G-CSF) growth factor and dexamethasone should be limited, when possible.

#### Head and Neck Cancers

Updated Indian Association of Surgical Oncology (IASO) guidelines for head and neck cancers recommend procedures, such as tracheostomy, carotid artery ligation, or endoscopic NG tube insertion/stenting, for emergencies like stridor, bleeds, and dysphagia. Postponing of all the cosmetic reconstruction surgeries is recommended. T1 and T2 lesions should be operated with minimal hospitalization. Patients suitable for neoadjuvant therapy should be managed accordingly. Treatment of slowly progressing cancers including thyroid, parotid, and basal-cell carcinoma should be deferred. Patients with locally aggressive thyroid cancers/local invasion/airway compression should be immediately treated with surgery. Early surgery may also be considered in cases of uncontrolled hyperparathyroidism. Neoadjuvant radiotherapy and/or chemotherapy should be preferred for patients with esophagus cancers; surgery may be postponed by 3 weeks by using neoadjuvant treatment.<sup>30</sup>

#### Lung Cancer

Most lung cancers are diagnosed in advanced (inoperable) stage and can be continued on standard treatment with chemotherapy, radiotherapy, and/or targeted therapy. In patients with stage-I to -III lung cancers, a multidisciplinary tumor board should decide regarding surgery. High priority for surgical oncology includes drainage ± pleurodesis for pleural effusion, pericardial effusion, tamponade risk, and evacuation

of empyema-abscess, T2N0 tumors, resectable T3/T4 tumors, and resectable N1/N2 disease. Medium priority is assigned to patients with resectable nonsmall-cell lung cancer (NSCLC) with T1aN0 disease, where lung nodule(s) is an incidental finding (provided solid nodule >500 mm<sup>3</sup>; pleural-based solid nodule >10 mm; solid component >500 mm<sup>3</sup> in partially solid nodule; known volume doubling time <400 days, and there is new solid component in preexisting nonsolid nodule). Low-priority cases include likely benign conditions. Recommendations for medical oncology in patients with early stage, locally advanced, and metastatic lung cancers have been summarized in **Table 3**. Potential regimen alterations for NSCLC includes oral therapy (e.g., oral tyrosine kinase inhibitors [TKIs], oral etoposide, oral topotecan, and oral temozolomide) Patients with progressive disease can be evaluated with liquid biopsy instead of tissue biopsy if appropriate.<sup>31-33</sup>

**Hematological Malignancies**

Hematological malignancies can be divided into three categories according to intent of therapy, potentially curable,

controllable, and palliative. Potentially curable leukemias and high-grade lymphomas should be treated using standard protocols without compromise in dose intensity. Growth factors, as well as supportive care, must be used appropriately during therapy. The lymphoma/leukemia/myeloma treatment recommendations in the era of COVID-19 are summarized in **Table 4**.<sup>34,35</sup>

In patients with early-stage Hodgkin’s lymphoma, baseline positron emission tomography (PET) scan and interim PET scan should be utilized to optimize the number of standard ABVD (doxorubicin, bleomycin, vinblastine, and dacarbazine) chemotherapy cycles required. Intensive BEACOPP regimen (bleomycin, etoposide, doxorubicin hydrochloride, cyclophosphamide, vincristine, procarbazine, and prednisone) should be used upfront only for advanced disease or those with sub-optimal response to two to three cycles of standard ABVD. Radiation therapy can be avoided and alternative regimens can be tried to reduce repeated hospital visits.

In case of relapsed leukemias and lymphomas, consider the use of outpatient-based salvage therapy (e.g.,

**Table 3** Recommendations for lung cancer medical oncology<sup>32</sup>

Levels	Early stage	Locally advanced stage	Metastatic
High	<ul style="list-style-type: none"> <li>Concomitant chemoradiotherapy for SCLC limited disease stage I/II</li> <li>Neoadjuvant chemotherapy (enabling deferral of surgery by 3 months) in clinical stage II</li> <li>Delivery of adjuvant chemotherapy in T3/4 or N2 disease for young (&lt;65 years old) and fit patients</li> <li>G-CSF use if febrile neutropenia risk evaluated to be &gt;10–15%</li> </ul>	<ul style="list-style-type: none"> <li>Concomitant chemoradiotherapy for SCLC limited disease stage III</li> <li>Concomitant or sequential chemoradiotherapy for inoperable NSCLC Stage III</li> <li>Starting consolidation durvalumab (within 42 days)</li> <li>Neoadjuvant chemotherapy in clinical stage III</li> <li>G-CSF use if febrile neutropenia risk evaluated to be &gt;10–15%</li> </ul>	<ul style="list-style-type: none"> <li>First-line treatment including chemotherapy, chemotherapy plus IO, IO alone or TKIs to improve prognosis, cancer-related symptoms and QoL</li> <li>Start second-line chemotherapy or IO in symptomatic and progressive disease patients</li> <li>Start 2nd-line TKI in progressive disease patients</li> <li>G-CSF use has to be considered if despite optimal dose modification, risk of febrile neutropenia is &gt;10%</li> <li>Anti-PD-(L)1 scheduled cycles may be modified/delayed to reduce clinical visits</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Adjuvant chemotherapy in T2b-T3N0 or N1 disease should be discussed with patients, considering clinical features and prognosis</li> <li>Medical follow-up between two cycles should be performed only if necessary and by telephone</li> <li>Blood check between two cycles should be performed only if necessary and at home if possible</li> </ul>	<ul style="list-style-type: none"> <li>Medical follow-up between two cycles should be performed only if necessary and by telephone</li> <li>Blood check between two cycles should be performed only if necessary and at home if possible</li> </ul>	<ul style="list-style-type: none"> <li>Start 2nd and beyond line chemotherapy or IO in asymptomatic patients, in absence of threatening disease (volume/location)</li> <li>Consider, when feasible, oral chemotherapy treatment instead of intravenous (etoposide, vinorelbine) to reduce hospital visits</li> <li>Medical follow-up between two cycles by telephone</li> <li>Blood check between two cycles should be performed only if necessary and at home if possible</li> <li>For patients ongoing with IO from more than 12/18 months, delaying the next cycle, omitting some scheduled cycle, or generally enlarging intervals should be considered</li> </ul>
Low	<ul style="list-style-type: none"> <li>Adjuvant chemotherapy in stage T1A-T2bN0 with negative prognostic features (lymphovascular infiltration, histological subtype). The risk versus potential benefit should be individually discussed with patients</li> <li>Adjuvant chemotherapy for patients with significant comorbidities, or elderly patients &gt;70 years, should be discussed and possibility omitted</li> </ul>	–	<ul style="list-style-type: none"> <li>Discontinuation of IO after 2 years of treatment should be considered, keeping in mind the lack of prospective evidence</li> <li>For patients ongoing with IO having stopped due to toxicity, resuming might be delayed in absence of disease progression</li> <li>Postpone antiresorptive therapy (zoledronic acid and denosumab) that is not needed urgently</li> </ul>

Abbreviations: G-CSF, granulocyte colony-stimulating factor; IO, immune oncology; NSCLC, nonsmall-cell lung cancer; QoL, quality of life; SCLC, nonsmall-cell lung cancer; TKI, tyrosine kinase inhibitors.

**Table 4** Summary of lymphoma/leukemia/myeloma treatment recommendations in the era of COVID-19 by disease<sup>34,35</sup>

Types of cancer	Treatment recommendations (lymphoma/leukemia/myeloma)
Hodgkin's lymphoma	<ul style="list-style-type: none"> <li>• ABVD to be used as upfront standard of care as an outpatient treatment</li> <li>• Avoid intensive chemotherapy combinations (brentuximab plus AVD, BEACOPP) for untreated patients to minimize risk of hospitalization.</li> <li>• Consider outpatient salvage chemotherapy regimens such as GDP when possible</li> </ul>
Non-Hodgkin's lymphoma—aggressive	<ul style="list-style-type: none"> <li>• CHOP with rituximab for B-cell NHLs. Avoid inpatient regimens for untreated aggressive NHL, except in selected circumstances (young patients with Burkitt's lymphoma or high-grade B-cell double-hit lymphoma)</li> <li>• Administer EPOCH-R as outpatient if possible</li> <li>• Select outpatient salvage regimens in relapsed disease. If autologous HSCT must be delayed, consider bridging with systemic therapy or localized radiotherapy</li> </ul>
Non-Hodgkin's lymphoma—indolent/ mantle-cell lymphoma	<ul style="list-style-type: none"> <li>• Consider deferring therapy until strongly indicated.</li> <li>• Consider low-dose local radiotherapy (2–3 Gy) for localized symptomatic disease control</li> <li>• Consider the use of less myelosuppressive/immunosuppressive regimens whenever possible</li> <li>• Refrain from anti-CD20 antibody maintenance therapy to allow for B-cell recovery</li> </ul>
Peripheral T-cell lymphoma	<ul style="list-style-type: none"> <li>• Standard CHOP with or without etoposide as outpatient treatment. Defer autologous HSCT indefinitely</li> <li>• In older patients with PTCL with a low chance of cure with multiagent regimens, consider front line therapy with novel single agents</li> </ul>
Chronic lymphocytic leukemia	<ul style="list-style-type: none"> <li>• Asymptomatic patients—"Wait and Watch"</li> <li>• If treatment initiation is required during the pandemic, an oral agent without the need for hospitalization, infusion, or frequent clinic visits would be preferred</li> <li>• COVID-19 negative, continue oral targeted agents but hold antibody treatments, chemotherapy, and IVIG infusions</li> <li>• COVID-19 diagnosis, hold CLL treatment with monoclonal antibodies and chemotherapy but consider continuing oral targeted agents in selected patients with high risk for disease flare after discontinuation</li> </ul>
Acute lymphoblastic leukemia	<ul style="list-style-type: none"> <li>• Curative-intent treatment of adults with ALL will require a period of inpatient management and blood product support. For a curable patient, consolidation/maintenance therapy unavoidable despite a risk of immunosuppression</li> <li>• Allogeneic HSCT is potentially debatable (particularly in MRD-negative CR1) and contingent upon response to therapy</li> </ul>
Acute myeloid leukemia	<ul style="list-style-type: none"> <li>• Curative-intent treatment of adults with AML will require a period of inpatient management and blood product support</li> <li>• Consider outpatient induction and consolidation when feasible with hypomethylating agents</li> <li>• Consider maintenance therapy if allogeneic HSCT is unavailable for patients who would normally be eligible</li> <li>• Consider less intensive treatment in patients with relapsed/refractory disease</li> </ul>
Myeloproliferative neoplasia/myelodysplastic syndrome	<ul style="list-style-type: none"> <li>• No changes to the general management of chronic MPNs, including phlebotomy, hydroxyurea, interferons, and Janus kinase inhibitors</li> <li>• Low-grade MDS, consider initiation of growth factors, such as ESAs and eltrombopag to decrease transfusion need; consider delaying HMAs</li> <li>• High-grade MDS, HMAs should be initiated or continued while definitive therapy with allogeneic HSCT is delayed</li> </ul>
Multiple myeloma	<ul style="list-style-type: none"> <li>• For newly diagnosed MM, prefer regimens that allow for limited exposure to health care facilities (i.e., allow for substitution of oral for intravenous chemotherapy, minimize dosing frequency)</li> <li>• Defer autologous HSCT for patients with MM and consider collecting and storing cells only</li> <li>• Continue maintenance therapy with lenalidomide or bortezomib</li> <li>• Consider holding anti-CD38 antibody treatment in patients with stable disease or in durable remission to mitigate risks of plasma-cell depletion</li> </ul>

Abbreviations: ABVD, doxorubicin, bleomycin, vinblastine, dacarbazine; ALL, acute lymphoblastic leukemia; AML, acute myeloid leukemia; AVD, doxorubicin, vinblastine, and dacarbazine; BEACOPP: bleomycin, etoposide, doxorubicin hydrochloride (Adriamycin), cyclophosphamide, vincristine (Oncovin), procarbazine and prednisone; CLL, chronic lymphocytic leukemia; COVID-19, novel coronavirus disease 2019; EPOCH-R, (etoposide, prednisone, vincristine, cyclophosphamide, doxorubicin, and rituximab); ESAs, erythropoiesis-stimulating agents; HSCT, hematopoietic stem-cell transplantation; HMAs, hypomethylating agents; IVIG, intravenous immunoglobulin; MDS, myelodysplastic syndromes; MM, multiple myeloma; MPNs, myeloproliferative neoplasms; MRD, minimal residual disease; NHL, non-Hodgkin's lymphoma; PTCL, peripheral T-cell lymphoma.

Adapted from: Percival et al.<sup>34</sup>



GDP-like regimens). If not feasible, decision regarding use of ICE/ESHAP/DHAP should be on case-to-case basis. Maintenance therapy with rituximab in indolent lymphomas may be postponed or temporarily held. Procedures such as high-dose chemotherapy and autologous hematopoietic stem-cell procedure must be decided in multidisciplinary tumor boards.

Chronic lymphocytic leukemia (CLL) patients should be treated with oral treatments and follow-up through teleconsultation is recommended. Patients in remission for >2 years should be recommended “Wait and Watch” strategy without the need to visit the hospital.<sup>33</sup> Omitting, delaying, or shortening radiotherapy should be considered wherever possible.<sup>34</sup>

Additional information, guidelines, and recommendations made by international oncology societies and bodies are also available for gastrointestinal (GI) malignancies (colorectal, pancreatic, esophageal, and hepatocellular), sarcomas, melanomas, cervical cancers, ovarian cancers, lymphomas, NSCLC, and prostate cancers.<sup>30,35-44</sup> In spite of all the precautions, it is possible that a cancer patient undergoing therapy might get infected with COVID-19. Such patients deserve aggressive treatment for the coronavirus infection like other noncancer patients.<sup>45,46</sup>

## Summary and Conclusion

In this rapidly evolving pandemic situation, India needs to take pragmatic actions to deal with the challenges of treating cancer patients (ensuring their rights, safety, and wellbeing). Treatment decisions should be individualized based on the risk/benefit ratio for each patient. Homecare with the help of telemedicine and local physicians should be encouraged where possible. The oncology professionals are the frontline fighters who have the key responsibility of providing the best revised cancer care strategy to their patients, taking into consideration the prevailing circumstances brought about by the COVID-19 pandemic. Patients and their families should proactively participate in the decision-making process, especially by stating their preferences. Cancer patients might need additional psychological support during the COVID-19 pandemic. Ongoing clinical trials might require steps to ensure a patient friendly approach while ensuring integrity of the study data. Cancer patients need to be triaged into high, medium, or low category of risk for treatment decision-making. Telemedicine consultation services need to be ramped up to minimize hospital visits. Treatment for patients with newly diagnosed potentially curable cancer must remain a priority. Procedures with high risk of aerosol contamination must be delayed or conducted with additional precautions to safeguard the health care professionals involved. Where treatment is unlikely to improve survival meaningfully or may compromise QoL/increase risk of COVID-19 infection, a wait and watch policy can be considered. Intravenous therapies can be replaced with oral therapies if appropriate. Intensive treatment (e.g., allogeneic stem-cell transplantations) should be considered only at well-equipped centers and for patients who have no other treatment options. Emergency anticancer therapy should not be denied to any patient.

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## Conflict of Interest

There are no conflicts of interest to declare.

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