




Radiation therapy during the coronavirus disease 2019 (covid-19) pandemic in Italy: a view of the nation's young oncologists

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The SARS-CoV-2 pandemic and covid-19 diffusion are an international public health emergency.¹ Cancer patients are particularly exposed to infections and their potential complications.² In this context, the usual clinical decision-making process in radiation therapy is being consistently revised.³ There is an urgent need to share expertise and offer emergency guidance. It is crucial to minimise contacts and to reduce the complexity of radiation treatments where possible to optimise the workforce, keeping intact the effectiveness of the interventions.⁴ Radiation and systemic therapy modifications should be implemented depending on local circumstances.⁵ A general guiding principle should include approaches where clinical equivalence supported by trials testing de-escalation strategies is present even without level 1–2 evidence (box 1, bullet points 1).³ Patients with cancer have an intrinsic degree of frailty and therefore are prone to covid-19 complications. Age and comorbidities have been reported as independent risk factors for poor outcome during covid-19 infection and, of note, more than half of cancer patients are elderly and have significant comorbidities (box 1, bullet points 2).⁶ Hence, an appropriate evaluation of the risk-benefit of radiation therapy treatments is cogent. Urgent cases and non-deferrable treatments (ie, active tumours, spinal cord compression, life threatening bleeding) should be initiated or continued, provided there is full compliance with the safety regulations of local authorities for both patients and staff members. In non-urgent cases, irradiation can be postponed to an extent, depending on the clinical setting and the possibility to offer patients bridging systemic therapies. Whenever radiation

therapy is indicated, dose prescription, fractionation and delivery techniques should be adapted, reduced in duration, and optimised (box 1, bullet points 3 and 4).

A timely example of precision medicine application is non-metastatic breast cancer radiation therapy, favouring moderate hypofractionation, partial breast irradiation, schedule optimisation, and tumour bed boost omission in adequately selected patients.^{7,8} Indeed, a practical international guideline to be used during the covid-19 pandemic has been implemented in several European countries.⁵ Although lung cancer patients usually present with respiratory symptoms (ie, cough, dyspnoea), they do not seem to have a higher mortality risk compared with other cancer types.² Especially in areas where the epidemic is rapidly rising, surgeons are forced to face a reduction in activity and are referring a higher number of operable early stage lung cancer patients to stereotactic body radiation therapy (SBRT).⁹ Sequential regimens should be preferred in patients suitable for concurrent chemo-radiation, while no data have been reported on immunotherapy; therefore, a case-by-case analysis of the risk-benefit ratio is advised. Regarding patients with low-grade gliomas and meningiomas, radiation therapy should be postponed or even omitted in the postoperative setting. Patients with high-grade gliomas with significant neurological deficit need to be reviewed on a case-by-case basis in order to assess the appropriateness of surgery. Irradiation might be omitted in methylated glioblastoma patients aged >60 years.¹⁰ In any case, moderate and/or ultrahypofractionated regimens should be considered whenever possible.^{2,8–10}

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The decision to start treatment for a covid-19 patient should be based on the biological features of the tumour, the symptom burden of the patient and the safety profile of the treatment. If a patient gets infected during the treatment the decision to proceed with it should be based on the balance between the risk of cancer progression versus the probability of suffering from severe covid-19 syndrome (box 1, bullet points 5).

Particular attention should be paid to patient safety. Most of the available indications come from the WHO, national authorities, and radiation therapy and oncology societies.^{11 12} They include an accurate triage to identify positive or suspected cases; the limited access to the radiotherapy department; paying careful attention to respect social distancing; and the availability of sanitising devices and personal protection equipment (PPE) (box 1, bullet points 6).¹³ All radiation oncology professionals (including physicians, therapists, medical physicists and nurses) must be properly trained and periodically updated about the clinical characteristics of covid-19, the risks of professional exposure, the correct use of PPE, and the available prevention and protection measures.

It is advisable to minimise the number of operators exposed to covid-19 positive or suspect patients. Therefore, depending on the available human resources, the staff might be divided into distinct units, specifically in charge of covid-19 positive cases.

In order to preserve their health and avoid virus transmission, healthcare professionals closely involved in the management of covid-19 positive or suspect patients must properly use PPE, including respiratory protection devices (preferably FFP2 or FFP3 respirators), eye protection goggles, surgical caps, long-sleeved water-resistant gowns, double gloves and shoe covers. Suspect infections or onset of symptoms attributable to covid-19 must be promptly notified, reporting and informing all the personnel and/or patients that had direct contacts. Isolation of suspected cases is mandatory, and the execution of repeated nasopharyngeal diagnostic swabbing is needed (box 1, bullet points 7). Hospital meetings, tumour boards and case discussions should be performed remotely. In this sense, the massive use of technology and artificial intelligence (AI) approaches is providing innovative tools, especially for new diagnostic and monitoring solutions for clinicians facing the epidemic in daily activity. Promising results have been obtained from AI applications for CT imaging-based diagnosis, and several e-health applications (eg, multidimensional data collection apps, video consultation platforms, virtual meeting tools) are spreading to ensure cancer care continuity, avoiding unnecessary physical contacts between patients and healthcare professionals and other hospital personnel (box 1, bullet points 8).¹⁴

As young oncologists working in several different frameworks, we are all implementing these recommendations in order to keep cancer care as safe as possible for both patients and healthcare providers (box 1). Depending on specific directives of the single institutions, in order

Box 1 Summary of cancer care contexts and practical recommendations for radiation therapy during the covid-19 outbreak

Bullet point 1: Global scenario

- ▶ The covid-19 pandemic is an international public health emergency.
- ▶ Cancer patients are frail and particularly prone to developing severe events related to covid-19.
- ▶ The clinical decision-making process for radiation therapy should be revised in this situation.

Bullet point 2: Covid-19 and cancer patients

- ▶ Cancer patients are more likely to be old and have comorbidities.
- ▶ Covid-19 is more severe in elderly patients and in those with comorbidities.
- ▶ Reducing the frequency of hospital visits and proper isolation protocols are warranted.

Bullet point 3: Radiation therapy during the covid-19 pandemic

- ▶ A careful evaluation of the risk-benefit ratio for each treatment should be performed for every patient.
- ▶ Urgent and non-deferrable cases should be safely planned for treatment; all the other treatments should be deferred.
- ▶ Radiation dose prescription, fractionation and technique should be optimised and adapted to the emergency context.

Bullet point 4: Specific clinical indications for radiation therapy

- ▶ To adopt treatments following the principle of clinical equivalence supported by trials which tested de-escalation strategies even without level 1–2 evidence.
- ▶ To favour reduction and simplification of radiation therapy duration (ie, hypofractionation, stereotactic body radiation therapy).
- ▶ To favour precision medicine and de-escalation approaches following a case-by-case assessment.

Bullet point 5: Deciding to treat with radiotherapy a cancer patient with covid-19

- ▶ If a patient is upfront positive, consider tumour biology, burden of symptoms and toxicity profile.
- ▶ If a patient turns positive, balance the risk between cancer progression and severe covid-19.
- ▶ Consider that 'less might be better' in this scenario.

Bullet point 6: Patient safety

- ▶ Follow WHO indications and national/international societies' recommendations.
- ▶ Limit access to radiation department, implement 'triage', respect social distancing, institute sanitisation.
- ▶ Prepare patient and caregivers, communicate and share information, operate thoughtfully.

Bullet point 7: Staff safety

- ▶ Staff training and education is crucial.
- ▶ A covid-19 dedicated staff is advisable (if feasible).
- ▶ Personal protection equipment is mandatory.

Bullet point 8: Technology facilitation

- ▶ Artificial intelligence-based imaging analysis allows reliable diagnosis for covid-19 pneumonia.
- ▶ The epidemic has boosted the use of video and teleconsultation, ensuring cancer care continuity.

Continued

Box 1 Continued

► Health informatics offers new tools for patient monitoring and may help in reducing the spread of covid-19.

to warrant ethical and effective treatments, a high level of homogeneity of protection against covid-19 strategies should be harmoniously implemented across Italian oncology centres. As recently suggested,¹⁵ we fully endorse the young oncologist perspectives (YOP) suggesting the need to protect *Y*ourself and your family (both at work and in personal life), provide *O*ncological care of our patients (by trying to minimise the impact of this emergency situation on the usual care), and prevent *P*atients from being infected. These same considerations should be fully applied in the field of radiation oncology.

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