A Radiation Oncology Departmental Policy for the 2019 Novel Coronavirus (COVID-19) Pandemic

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Abstract

The COVID-19 pandemic is placing unprecedented stress on healthcare systems around the world. Although Radiation Oncology Departments are not at the frontline of fighting this infectious disease, it is important to implement COVID-19 policies to reduce risk of staff and patient exposure, and to limit the risk of department shutdown or downtime. This brief report describes the policy implemented at George Washington University Radiation Oncology to manage the risks of COVID-19. This includes a General Statement related to the priorities of the Radiation Oncology department, a screening procedure for new and follow-up patients, management policies for critical and non-critical patients with COVID-19 or under quarantine, a policy for the management of patients currently under treatment who are diagnosed or placed in quarantine, a clinical escalation action plan, guidelines for staff meetings and travel, and procedure management. This policy was implemented at George Washington University Radiation Oncology after the first case of COVID-19 was reported in Washington DC on March 7, 2020.

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Introduction

The 2019 Novel Coronavirus (COVID-19) is an infectious disease first identified in Wuhan, China, which as of the writing of this article in March 2020, has community spread in the United States, Europe, and Asia.(1–4) COVID-19 has been declared to be a pandemic by the World Health Organization (WHO) and has an estimated global mortality rate of 3.4%.(5) More concerningly, there is the risk of spread within healthcare settings and infection of healthcare workers(6, 7). Additionally, in a study from China, patients with cancer were observed to have a higher risk of severe events due to COVID-19, and deteriorated more quickly.(8) Older populations of patients aged 60 or greater are also at high risk, with greater than 15% of symptomatic cases in this age group requiring hospitalization and greater than 30% of hospitalized cases in this age group requiring critical care.(9) It is highly likely that patients or staff exposed to COVID-19 will interact with Radiation Oncology departments.

This brief report describes the policy implemented at George Washington University Radiation Oncology to manage the risks of COVID-19. This includes a General Statement related to the priorities of the Radiation Oncology department, a screening procedure for new and follow-up patients, management policies for critical and non-critical patients with COVID-19 or under quarantine, a policy for the management of patients currently under treatment who are diagnosed or placed in quarantine, a clinical escalation action plan, guidelines for staff meetings and travel, and procedure management.

This policy was implemented after the first case of COVID-19 was reported in Washington DC on March 7, 2020.(10) Given the fluidity of the situation with continuously changing regulatory, supply chain, and other pandemic-related constraints, our policies have rapidly evolved alongside the pandemic. While the policy is not perfect, it does provide some structure to our measured response. As of March 17, 2020 there are 23, 67, and 58 confirmed cases in Washington DC, Virginia and Maryland, respectively. Additionally, there are known COVID-19 infections among both physicians and patients at the George Washington University outside of Radiation Oncology (personal communication), and radiation treatments continue at the current time.

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General Statement

Radiation Oncology Staff should be aware of guidance from the Centers for Disease Control (CDC)(11), local and state health departments, and local hospital administration. If at any point the Radiation Oncology policy contradicts CDC / local and state health departments, or hospital policy, then these external administration policies take precedence.

In general, Radiation Oncology facilities are outpatient clinics that operate under the assumption that all patients are at low risk of harboring infectious disease. Radiation Oncology treatment requires multiple contacts with staff and equipment, which are difficult to clean and not possible to sterilize. The same staff and equipment treat many patients per day, which raises the risk of exposure if patients are infectious.

The priority in writing this document is to:

(1) protect the health of non-infected patients,

(2) protect the health of the staff members,

(3) ensure the continuation of Radiation Oncology services and then

(4) to provide appropriate standard of care if feasible to quarantined or infected patients if priorities 1-3 are met.

In general, Radiation Oncology treatments are non-urgent and can be delayed for 14 days or greater to allow for recovery from coronavirus, or for conclusion of a quarantine period. This document will also address the rare urgent situations that may arise.

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Patient Screening

All patients scheduled will be screened according to CDC guidelines (12) ahead of their appointment and upon arrival in the clinic:

- Anyone showing the following symptoms – ask if they have had:
    - Fever
    - Cough
    - Shortness of Breath
    - Emergency warning signs
        - Difficulty breathing or shortness of breath
        - Persistent pain or pressure in the chest
        - New confusion or inability to arouse
        - Bluish lips of face
- Have they had a travel history to an affected country (including but may not be limited to):
    - Widespread Sustained Transmission
        - China
        - Iran
        - South Korea
        - Europe

  Use this link to identify current affected countries in the CDC Travel Health Notices: https://wwwnc.cdc.gov/travel/notices#travel-notice-definitions.
- Have they been exposed to anyone with known exposure to a presumptive-positive/confirmed COVID-19 patient within the last 14 days?
- If the patient says yes to the above questions, their appointment will be rescheduled.

If the patient says yes to the above questions, their appointment will be rescheduled the patient should be directed to the local health department for evaluation and possible COVID-19 testing as indicated. This same screening of patients and escorting family members will be repeated outside the building of the radiation oncology building or clinic. Any screen positive patients at this time will be asked to wear a mask and gloves and placed in a designated isolation room in the radiation oncology or cancer center building. If the patient is severely ill, they will need to be evaluated for possible admission to the hospital in an isolation room. Follow your local hospital administration guidelines. If the patient is not acutely ill enough to require admission, contact your local health department for further recommendations for screening or COVID-19 testing.

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Non-Critical Cancer Cases (NCCC)

Non-Critical Cancer Case (NCCC) is a cancer case where a delay in radiation treatment for 14 days or greater is unlikely to result in a loss of life or a permanent loss of organ function.

Examples of NCCCs include but are not limited to: Breast Cancer, Prostate Cancer, Rectal Cancer, Lung Cancer, Anal Cancer, Head and Neck Cancer, Brain Tumors, Sarcomas, any non-symptomatic metastatic disease, and any non-life threatening metastatic disease.

If a patient has NCCC **and** diagnosis of coronavirus or is under quarantine for coronavirus, then the patient will not be seen in consult or follow up by radiation oncology and radiation therapy will not start until after a **waiting period**.

The coronavirus waiting period is defined as a treatment delay for 14 days, or until the patient quarantine is completed, or the patient is non-infectious as defined by guidance from the CDC.

During the waiting period, the physician can still discuss care with the patient by phone, review medical records, and discuss care with the consulting physician. However, the patient will not come to the radiation oncology clinic.

Again, it should be emphasized that patients under quarantine or who have coronavirus and have a NCCC will not routinely be seen or treated in radiation oncology clinic until after a waiting period. Follow your local health system administration guidelines regarding this patient population. Discussions with the patient can proceed by phone or other telemedicine techniques.

This policy regarding NCCC is specific to the George Washington University, and should be modified to local circumstances at other institutions.

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Critical Cancer Cases (CCC)

Critical Cancer Cases (CCC) are those cases where a delay of treatment for 14 days or greater may result in a loss of life or a permanent loss of organ function.

Examples of CCC include but are not limited to cord compression, superior vena cava syndrome, life threatening tumor bleeding, airway obstruction by tumor, and highly symptomatic brain metastases. Other circumstances may also be CCC at the discretion of the treating physician.

At the present time, patients with a known coronavirus infection will not be treated in the radiation oncology department until after the waiting period and they are non-infectious. This applies even if they have a CCC. This is because at the present time (as of 3/17/20) under the specific circumstances at the George Washington University, there is no way to ensure safe treatment in radiation oncology without spread of coronavirus to staff or other patients. Alternatives such as medical management, or management by other specialties should be considered. This will be explained to the patient/family and the referring physician. If the coronavirus becomes endemic, and it is expected that patients with coronavirus and cancer become more common, this policy may have to be re-addressed at a future time.

At the present time, if a patient is under quarantine and has a CCC, then the case will be addressed on a case by case basis. There might be feasibility in treatment as most patients under quarantine are not infected or infectious, and a CCC is important event. There will be a discussion between the treating physician, chairman or director of radiation oncology, clinic manager of radiation oncology, and hospital administration regarding treatment. If you have multiple Linear Accelerators (LINACS) and centers then a single LINAC should be designated for treating patients with suspected or known COVID-19 infection.

If a patient under quarantine and CCC is deemed a candidate for receiving radiation, they will be scheduled as the last patient of the day and brought into the radiation oncology department with gloves and mask on and bypass the patient waiting area. Radiation oncology staff will have personal protective equipment including N95 mask, eye protection, and body gown protection. Simulation and treatment will occur on the same day and the patient will be kept in an isolated room during the waiting period. All rooms, including simulator, treatment room, and the room in which the patient waited will be thoroughly cleaned. (13, 14)

Whenever possible, single fraction regimens and very hypofractionated regimens should be used, in accordance with the guidelines of the National Comprehensive Cancer Network (NCCN) (15), including for spinal cord compression(16) and for whole brain radiation (17). Other options include “Quad-Shot”(18) or “Spanos” (19) regimens for head and neck and pelvic tumors. It should be remembered that the entire course of treatment does not need to be given during the quarantine period. It should be considered that a single fraction might be sufficient to alleviate symptoms during the 14 day quarantine period so that the remaining course of RT can be continued after quarantine.

The ideal patient under quarantine with CCC who will be treated with radiation is a young non-metastatic patient, with CCC related to the tumor who might still receive curative treatment at a future time. Examples include but not limited to: 1) Critical airway obstruction or SVC syndrome in a non-metastatic lung cancer patient, 2) Critical bleeding in a non-metastatic Gyn or GI cancer patient. Patients who have metastatic cancer and have a terminal diagnosis are not ideal candidates for radiation treatment under quarantine because radiation will not change their ultimate outcome. Alternatives such as medical

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management, or management by other specialties should be considered. This will be explained to the patient/family and the referring physician.

The ethical implications of denying radiation therapy to patients with COVID-19 or under quarantine will not be considered in depth in this report but is certainly of great concern. An ethics consultation may be helpful in difficult cases.

This policy regarding CCC is specific to the George Washington University, and should be modified to local circumstances at other institutions.

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Patients Currently Undergoing Radiation Treatment

If a patient currently receiving daily radiation receives a diagnosis of coronavirus or undergoes quarantine for coronavirus, then strongly recommend that their radiation treatment be immediately interrupted. The patient will be asked not to return to the radiation oncology department until after a waiting period, which includes a 14 day quarantine or until they are non-infectious. Follow local hospital guidelines and consider medical ethics consultations where available for this patient population.

If the patient is receiving curative-intent radiation, then the remainder of the treatment can be delivered after the waiting period, with compensation for the 2 week delay in radiation therapy. Examples of dose compensation are included in a recent paper on disaster mitigation in radiation oncology in Puerto Rico after Hurricane Maria.(20) **Table 1.** If the patient is receiving palliative radiation, then the remaining fractions can be delivered after the waiting period with or without adjustment.

Table 1 Compensation for a 2-3 week delay in radiation therapy(20)

Author's Note: This table is copied from reference 20 with permission from the corresponding author and Elsevier for reprinting.

Cancer	Clinical scenario	Impact of gap	Recommendations
NSCLC	Locally advanced, postoperative	Low	Restart therapy when possible. Given that these are usually patients with concern for microscopic disease who have already received (or are receiving) chemotherapy, the impact of a treatment break and concerns about tumor repopulation are lower than those for patients with gross disease.
	Locally advanced, definitive	High	Restart these patients sooner than the postoperative patients. **Concurrent chemotherapy group:** Recommend restarting with standard fractionation. If the patient has a prolonged delay, consider adding a cycle of chemotherapy at a systemic dose during the treatment break. **RT alone group:** RT-alone group (or sequential chemoRT group). Consider modest hypofractionation of no more than 2.53 Gy per fraction to a total dose of 63.25 Gy without chemotherapy and **no** highly conformal treatment techniques. For highly conformal image guided/intensity modulated RT techniques, consider 60 Gy in 15 fractions without chemotherapy.[28] Consider these schedules especially for larger or more aggressive tumors.
SCLC	Limited stage	Very high	Restart thoracic as soon as possible (even midcycle) and preferentially switch to twice a day per Turrisi. Consider following curative chemoradiation regimens of 40 Gy in 15 fractions, 40 Gy in 16 fractions, or 42 Gy in 15 fractions, or 39.9 Gy in 15 fractions. The potential advantage of these schedules is that the dose constraints are usually easily met (cord <36 Gy; V18<37%). A patient who had a few fractions followed by a long

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			break often can safely receive this schedule upon restart with an acceptable composite plan.
	Extensive stage	Very high	If the delay caused deferment of prophylactic cranial irradiation or consolidative thoracic RT, decide on a case-by-case basis.
Head and neck	1 wk (~10 Gy) of RT, followed by a 2-3 wk break or longer	High	The tumor impact of the initial 10 Gy is essentially lost. Deliver the full prescription dose of 60-70 Gy without reduction once the patient is able to resume therapy.
	Received more than a few weeks of treatment, followed by a treatment interruption	High	Consider accelerated and/or hyperfractionated schedules to try and maintain the overall total treatment time.
	Received substantial radiation dose and then an extended treatment break (on the order of months)	Very High	Surgical salvage. If not feasible, consider full-dose reirradiation despite the known higher risk for late-normal tissue toxicity. In this challenging situation, only treating the gross disease while avoiding elective regions is warranted.
Uterine cervix	Definitive	High	Consider adding approximately 5 Gy per wk with 3-dimensional image-based brachytherapy for each week of radiation duration beyond 7 weeks, respecting the organ-at-risk tolerance doses. This must be carefully weighed against the doses that the organs at risk will receive by adding this extra dose to the tumor. For a 2-3 week interruption, strive for a minimum of 50.4 Gy instead of 45 Gy to the pelvis. Do not recommend twice a day or other altered schedule (weekend or otherwise). Do not discount any previously given dose. The use of LDR instead of HDR brachytherapy would eliminate any need for electricity. If HDR is available only, the physician can admit the patient to the hospital and administer multiple sequential HDR treatments up to twice a day to complete the therapy in a shorter period of time. Use of 4 fractions of 700 cGy rather than 5 fractions of 500-600 cGy can also be considered. Starting the brachytherapy during the course of external beam is feasible, but external beam should not be given on the same day as brachytherapy. No treatment break should be given between external beam and brachytherapy.
	Postoperative	Moderate	Consider adjuvant vaginal cylinder brachytherapy.
Breast	Breast-only treatment	Low	Do not change the whole-breast dose in the setting of a treatment break (continue the original 42.56 Gy in 16 fractions or 50 Gy in 25 fractions). The boost portion of the treatment dose gets adjusted as follows: • Initial treatment plan did not include a sequential boost to the lumpectomy cavity PTV: 10 Gy in 5 fractions boost. • Initial treatment plan included a sequential boost to the lumpectomy cavity PTV: Add one 2 Gy fraction per week missed up to 66 Gy; alternatively, a 2.3 Gy × 5 boost. If the intended boost was

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			to 66 Gy, increase the dose up to 70 Gy, and consider reducing the volume to the highest risk region.
	Chest wall after mastectomy	Low	Similar to above, but substitute lumpectomy cavity PTV for mastectomy scar PTV.
	Regional nodal (supraclavicular, axillary, internal mammary chain) with breast or chest wall	Low	Dose is adjusted to a maximum of 50 Gy in 2 Gy fractions.
Prostate		Very low	For treatment delays <1 wk, no need for corrective action. ADT may safely mitigate delays up to 2 weeks. For patients receiving RT alone for whom a long break is anticipated, consider starting ADT. For patients not undergoing ADT, 1-2 conventional fractions may compensate for a 1-wk break if normal tissue tolerance allows. Accelerating treatment to 6 fractions per wk (1 twice-daily treatment per wk) or switching to a moderately hypofractionated course may help compensate for treatment gaps.[23] When hypofractionating, maintain an equal or slightly higher EQD2 for the tumor using an α/β ratio of 1.5 without exceeding the EQD2 of normal tissues using an α/β ratio of 3.

Adapted from Gay et al. Lessons Learned From Hurricane Maria in Puerto Rico: Practical Measures to Mitigate the Impact of a Catastrophic Natural Disaster on Radiation Oncology Patients. Practical Radiation Oncology 2019. (20) *Adapted with permission from the corresponding author and Elsevier.*

Abbreviations: ADT = androgen deprivation therapy; EQD2 = equivalent dose in 2 Gy; HDR = high dose rate; LDR = low dose rate; NSCLC = non-small cell lung cancer; PCOC = Prepare, Communicate, Operate, Compensate; PTV = planning target volume; RT = radiation therapy; SCLC = small cell lung cancer.

Hospital administration should be notified of the exposure, as well as all staff and patients treated on the related equipment. All exposed treatment rooms and equipment will need to be thoroughly cleaned. Exposed staff may need to be quarantined for a 14 day period according to local and hospital guidelines.

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Radiation Oncology Covid-19 Clinical Escalation Action Plan

I) Phase One Escalation (No to Mild Medical Center Disruption):

- ***Practice social distancing and teleconferencing when feasible to avoid crowds***
- ***Routine Follow up appointment scheduling/rescheduling***
- ***Daily Departmental Physician Covid-19 Triage and Clinical Preparedness Huddle***

A. Patients who just completed radiation therapy:

1. All prostate and breast cancer patients who have mild/no symptoms can be scheduled in 3 months, although further extensions may be necessary if pandemic conditions persist.
2. All other patients the physicians will determine follow up times on a case by case basis.

B. Patients who completed treatment radiation therapy < 1 year ago:

1. Patients who have symptoms or concerns should come to their appointments as scheduled
2. Patient who have no symptoms or concerns can be scheduled 2 months from now.

C. Patients who completed treatment > 1 year ago:

1. Patients who have symptoms or concerns should come to their appointments as scheduled
2. Reschedule existing scheduled patients who have no symptoms or concerns for 3 months from current appointment.

No delays in patient treatment expected.

II) Phase Two Escalation (Moderate Medical Center Disruption):

- ***Minor Changes in New Patient Consultations and Patient Treatments***
- ***Daily Departmental Physician Covid-19 Triage and Clinical Preparedness Huddle***

Non-Urgent Consultation and New Treatment Start Delays:

A. Can delay consultations for up to 2 months for the following patients without symptoms:

1. Prostate cancer patients
2. Benign CNS tumor patients (e.g., meningioma, schwannoma)
3. Benign musculoskeletal conditions (e.g., plantar or palmar fibromas, keloids, heterotopic bone cancer)

B. Can delay consultations for up to 1 month for the following patients without symptoms:

1. Stage I endometrial cancer patients after hysterectomy
2. Post-operative breast cancer patients within two weeks of their surgery

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C. If any questions, ask the appropriate attending physician to review the patient's records to triage the patient to determine when they should be seen.

Expect potential treatment delays of all other patients by 1-2 weeks.

III) Phase Three Escalation (Major Medical Center Disruption):

- ***Triage of Patient Care to most critical patients with long treatment delays expected***
- ***Daily Departmental Physician Covid-19 Triage and Clinical Preparedness Huddle***

Long Delays in Treatment Starts or Treatment Interruptions and Extensive Patient Triage:

A. All new patient consultations, follow up appointments and treatments to be assessed/triaged on a daily basis.
B. Assess staffing daily and determine if the Radiation Oncology department should remain open or be closed to maximize utilization of mission critical clinic staff.
C. Expect potential treatment delays of patients by up to 3-4 weeks due to staff illness and quarantine resulting in workforce shortages and/or due to medical center mandates.
D. Expect need for Medical Ethics Consultation/Guidance in some cases in which life saving/prolonging radiation therapy care is not provided (ie patient's with known Covid-19 infection and or in quarantine).
E. Expect greater use of NCCN Supportive Care Guidelines instead of palliative radiation for appropriate patients.

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Staff Policies

To promote social distancing, administrative and research staff are encouraged to telework, if feasible. Meetings, including tumor board conferences, are encouraged to be remote, or reduced to essential faculty only and asking others to participate remotely. Meetings of fifty people or greater should be suspended, and it is encouraged to limit the amount of people in a meeting space to one-third the occupancy of the space. Reductions in staff per shift and staggered shifts can be considered to reduce exposure.

Travel and education policy should be according to local guidelines. Currently, at the George Washington University, all international travel is suspended for students, faculty and staff. Domestic travel is also currently suspended for faculty, staff, and students in healthcare-facing positions. Medical student rotations are also currently suspended.

Staff with potential exposure to COVID-19 should be managed according to the recommendations of the CDC (21) and local hospital policies.

Procedures

The United States Surgeon General has recommended that elective procedures be avoided (22) and the American College of Surgeons have issued guidance on the triage of non-emergent surgical procedures. (23) They recommend that hospitals should consider both their patients' medical needs, and their logistical capability to meet those needs, in real time. Furthermore, the risk to the patient should include an aggregate assessment of the real risk of proceeding and the real risk of delay, including the expectation that a delay of 6-8 weeks or more may be required to emerge into an environment in which COVID-19 is less prevalent. A report from China also reported increased adverse outcomes in patients with cancer and COVID-19.(8) The authors of the Chinese paper recommended consideration of postponing of adjuvant chemotherapy or elective surgery for stable cancer in endemic areas. Ultimately, the decision to postpone surgery or chemotherapy depends on the judgement of our surgical and medical oncology colleagues, and a multidisciplinary discussion is encouraged.

In the case of moderate or major medical center disruption or at times of high endemic spread, Radiation Oncologists should commit to the shortest guidelines-concordant treatment schedules and the most streamlined workflows to plan for potential staff shortages. Elective radiation such as those for benign tumors, or low risk prostate cancer can be delayed during episodes of disruption or high endemic spread. Elective brachytherapy procedures can also be postponed. However, brachytherapy procedures in which treatment time is critical, such as cervix cancer(24), should remain undisrupted.

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Conclusion

The COVID-19 pandemic is placing unprecedented stress on healthcare systems around the world. Although Radiation Oncology Departments are not at the frontline of fighting this infectious disease, it is important to implement COVID-19 policies to reduce risk of staff and patient exposure, and to limit the risk of department shutdown or downtime. The above policy was implemented at George Washington University in March of 2020, and may be helpful to other Radiation Oncology departments. Other policies, such as personal protective equipment guidelines, equipment cleaning guidelines, and hypofractionation guidelines are not described in this document, and require further clarification in future reports. We recognize that policies and approaches will need to be adapted to local conditions and resources, and guidelines may need to rapidly change as the pandemic evolves.

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