RESEARCH LETTER

Outcomes in Radiotherapy-Treated Patients With Cancer During the COVID-19 Outbreak in Wuhan, China

Several health care services have been affected by the novel coronavirus disease 2019 (COVID-19) pandemic. A delay in diagnosis and treatment can be detrimental to patients with cancer.1,2 However, patients with cancer are also at risk for COVID-19 because of immunosuppressive treatments and recurrent visits to the hospital.3 In this article, we report preliminary outcomes in 209 patients who underwent radiotherapy at the Zhongnan Hospital of Wuhan University (ZHWU) during the COVID-19 outbreak in the city of Wuhan, China.

Methods | All patients who were treated at the Department of Medical and Radiation Oncology, ZHWU, from January 20 to March 5, 2020, were included. Public health measures implemented during the study period included city lockdown (January 23, 2020), cordon sanitaire, traffic restriction, social distancing, and home confinement. We analyzed patient demographics as well as clinical and treatment parameters. Survival status of all patients was updated as of March 12, 2020. This study was approved by the ZHWU institutional review board (No. 2020041) with waiver of informed consent for the use of aggregated, anonymized patient data.

Results | The Table summarizes the clinical characteristics of 209 patients and their treatment details. Median (interquartile range) age of the patients was 55 (48-64) years; 104 patients (49.8%) were men, and 105 (50.2%) were women. Most patients had thoracic cancer (n = 80 [38.3%], including lung, breast, and esophageal cancers), head and neck cancer (n = 53 [25.4%]), or gastrointestinal or gynecological cancer (n = 54 [25.8%]). Of the patients, 99 (47.4%) received adjuvant radiotherapy, whereas 57 (27.3%) and 53 (25.3%) underwent radical and palliative radiotherapy, respectively; 67 patients (32.1%) received concurrent chemoradiotherapy. All patients had already begun treatment prior to the start study date.

Unfortunately, 112 patients (53.6%) were unable to return for radiotherapy after the lockdown. Among the 67 patients receiving chemoradiotherapy, 3 (4.5%) had completed treatment and 62 (92.5%) discontinued treatment (58 could not return, and 4 discontinued by the physician’s choice); only 2 patients (3.0%) resumed chemoradiotherapy. Before the lockdown, the mean (range) number of patients per day was 188 (160-209). However, these numbers dropped sharply after the date of lockdown and declined with each subsequent week (mean [range] number of patients per day, 12 [2-66]) (Figure).

We recorded only 1 case (0.5%) of confirmed severe acute respiratory syndrome coronavirus 2 infection during the study period. Although 70 patients (33.5%) had a history of contact with this patient, none of them developed clinical symptoms of COVID-19. Of these 70 patients, 52 (74.2%) were unable to resume radiotherapy after the lockdown, while 18 (25.8%) continued radiotherapy without delay. All patients were alive as of March 12, 2020.

Discussion | To date, more than 10 000 000 humans have been diagnosed as having COVID-19. This disease is highly infectious, since both asymptomatic and symptomatic individuals can transmit the virus.4,5 Extensive public health measures that are focused on physical distancing and tight

Table. Clinical and Treatment Characteristics of the Study Patients

| Characteristic | No. (%) |
|----------------|---------|
| **Clinical details** | |
| Sex | |
| Male | 104 (49.8) |
| Female | 105 (50.2) |
| Age, median (IQR), y | 55 (48-64) |
| Cancer diagnosis | |
| Head and neck | 53 (25.4) |
| Thoracic a | 80 (38.3) |
| Lower gastrointestinal and gynecological | 54 (25.8) |
| Others | 22 (10.5) |
| **Hospitalized** | 172 (82.3) |
| **Outpatient** | 37 (17.7) |
| **Treatment details** | |
| Radiotherapy alone | 142 (67.9) |
| Concurrent chemotherapy and RT | 67 (32.1) |
| RT details | |
| Radical | 57 (27.3) |
| Adjuvant | 99 (47.4) |
| Palliative | 53 (25.3) |
| RT regimens | |
| Conventional | 186 (89.0) |
| Hypofractionation | 23 (11.0) |
| **Phase of RT at the start of study period** | |
| Week 1-2 | 191 (91.4) |
| Week 3-4 | 11 (5.3) |
| Week 5-7 | 7 (3.3) |
| **Treatment interruption after lockdown, No. of patients** | |
| RT interruption b | 112 (53.6) |
| Chemotherapy interruption c | 62 |
| **No. of RT sessions per day, mean (range)** | |
| Before lockdown | 188 (160-209) |
| After lockdown | 12 (2-66) |

Abbreviations: IQR, interquartile range; RT, radiotherapy.
a Includes lung, breast, and esophageal cancer patients.
b Lockdown of Wuhan city occurred on January 23, 2020.
c 58 discontinued due to lockdown; 4 discontinued due to physician decision.
containment have been implemented. In the city of Wuhan, China, such measures were effective in limiting virus transmission and reducing daily new COVID-19 cases across all age groups. However, there are concerns that these public health measures will affect the delivery of other health care services.

In this article, we share our experience with the COVID-19 lockdown and the delivery of radiotherapy in patients with cancer at ZHWU in Wuhan, China. Caseloads were substantially reduced (a 10-fold drop after lockdown). More than half of the patients in this case series were unable to return to the city for treatment, which is a consequence of the massive human migration (Chunyun) for the Spring Festival that preceded the lockdown. Additionally, physicians were conservative in resuming chemoradiotherapy. Long-term follow-up data may reveal detrimental ramifications of treatment interruption on the survival of these patients with cancer.

Influence of public health measures on the daily number of patients undergoing radiotherapy at the Zhongnan Hospital of Wuhan University.

Figure. Radiotherapy Caseload per Day During the Coronavirus Disease 2019 Outbreak

### Letters

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# Contributions

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COVID-19 in Children With Cancer in New York City

Data on the prevalence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection in children,\(^4\) and in children with cancer specifically have been limited. Less than 1% of cases reported from China were in children younger than 10 years.\(^3\) The MSK Kids pediatric program at Memorial Sloan Kettering Cancer Center (MSK) is one of the largest pediatric cancer programs in the US. Starting in mid-March, 2020, we instituted a screening and testing plan to mitigate risk associated with coronavirus disease 2019 (COVID-19).

Methods | On presentation for outpatient or inpatient care, patients were screened for the presence of symptoms of COVID-19 or exposure to contacts with known SARS-CoV-2 infection. We also instituted testing for SARS-CoV-2 using a RT-PCR assay for 3 cohorts of individuals: (1) patients exposed to COVID-19 (screen positive) or with symptoms of infection (symptom positive); (2) asymptomatic patients (symptom negative) prior to deep sedation, myelosuppressive chemotherapy, or admission to the hospital; and (3) caregivers accompanying patients for admission or multiday outpatient chemotherapy. Data for this report were gathered in a retrospective research protocol approved by the MSK institutional review board with waiver of informed consent owing to the retrospective and deidentified nature of the data used. Groups were compared using a 2-tailed Fisher exact test.

Results | Between March 10 and April 12, 2020, a total of 335 tests for SARS-CoV-2 were performed on pediatric patients and their caregivers (Table 1). Of the 178 unique pediatric patients (107 male and 71 female) tested (mean [SD] age 11.1 [8.5] years), 20 (11.2%) had positive test results (mean [SD] age 15.9 [6.6] years). Of patients specifically tested for positive screening or symptoms (screen positive or symptom positive), the rate of positivity for SARS-CoV-2 was 29.3%. By comparison, in the 120 asymptomatic patients without known exposure (screen negative and symptom negative) the rate of SARS-CoV-2 positivity was only 2.5% (29.3%; 95% CI, 18.1%-42.7% versus 2.5%; 95% CI, 0.5%-7.1%; \(P < .001\)) (Table 1). Of the 20 patients who tested positive for SARS-CoV-2, only 3 were female (Table 2), a significant sex skewing when compared with pediatric patients who tested negative (15%; 95% CI, 3%-38% vs 43%; 95% CI, 35%-51%; \(P = .02\)).

Only 1 patient with COVID-19 illness required noncritical care hospitalization for COVID-19 symptoms. Three other patients without significant COVID-19 symptoms were admitted for concomitant fever and neutropenia, cancer morbidity, or planned chemotherapy. All other pediatric patients had mild symptoms and were managed at home.

We also instituted testing of adult caregivers of patients (Table 1). Of the 74 individuals tested, 13 caregivers (17.6%) of 10 patients tested positive for SARS-CoV-2. Notably among 68 asymptomatic and unexposed caregivers (screen negative and symptom negative), 10 tested positive for SARS-CoV-2 (14.7%). Simultaneous detection of virus in patient and caregiver was found in 5 patient/caregiver dyads, whereas 5 patients were negative for virus despite close exposure to caregivers with COVID-19.

Discussion | Although this report is limited by small numbers, the data show that (1) the overall morbidity of COVID-19 in pediatric patients with cancer is low with only 5% requiring hospitalization for symptoms of COVID-19; (2) that the rate of SARS-CoV-2 infection among asymptomatic pediatric patients is very low; (3) that unrecognized SARS-CoV-2 infection in asymptomatic caregivers is a major infection control consideration; and (4) that consistent with the sex difference previously seen in adults with critical disease,\(^6\) there is a male bias in SARS-CoV-2 infections in children, suggesting a biological basis in skewed infectivity.

This report suggests that pediatric patients with cancer may not be more vulnerable than other children\(^2\) to infection or...