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OPERATIONS AND ECONOMICS IN A PANDEMIC

COVID's Impact on Radiation Oncology: A Latin American Survey Study



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Purpose: The impact of the COVID-19 pandemic on Latin American radiation therapy services has not yet been widely assessed. In comparison to centers in Europe or the United States, the scarcity of data on these terms might impair design of adequate measures to ameliorate the pandemic's potential damage. The first survey-based analysis revealing regional information is herein presented.

Methods and Materials: From May 6 to May 30, 2020, the American Society for Radiation Oncology's COVID-19 Survey was distributed across Latin America with support of the local national radiation therapy societies. Twenty-six items, including facility demographic and financial characteristics, personnel and patient features, current and expected impact of the pandemic, and research perspectives, were included in the questionnaire.

Results: Complete responses were obtained from 115 (50%) of 229 practices across 15 countries. Only 2.6% of centers closed during the pandemic. A median of 4 radiation oncologists (1-27) and 9 (1-100) radiation therapists were reported per center. The median number of new patients treated in 2019 was 600 (24-6200). A median 8% (1%-90%) decrease in patient volume was reported, with a median of 53 patients (1-490) remaining under treatment. Estimated revenue reduction was 20% or more in 53% of cases. Shortage of personal protective equipment was reported in 51.3% of centers, and 27% reported personnel shortage due to COVID-19. Reported delays in treatment for low-risk entities included early stage breast cancer

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(42.6%), low-risk status prostate cancer (67%), and nonmalignant conditions (42.6%). Treatment of COVID-19 patients at designated treatment times and differentiated bunkers were reported in 22.6% and 10.4% of centers, respectively. Telehealth initiatives have been started in 64.3% of facilities to date for on-treatment (29.6%) and posttreatment (34.8%) patients.

Conclusions: Regional information regarding COVID-19 pandemic in Latin America may help elucidate suitable intervention strategies for personnel and patients. Follow-up surveys will be performed to provide dynamic monitoring the pandemic's impact on radiation therapy services and adoption of ameliorating measures. © 2020 Elsevier Inc. All rights reserved.

Introduction

The outbreak of the coronavirus-2-related acute respiratory distress syndrome pandemic by late 2019 has had a particularly deep impact on cancer health care due to the inherent features of this high-risk group of patients.^{1,2} Scientific reports from Asia, Europe, and North America have remarked on the difficulties to overcome to guarantee proper delivery of continuous oncologic treatment.³⁻⁵ Scarce data regarding the impact of COVID-19 on developing economies have been published to date.

Latin America constitutes a region where health care, especially oncology, has been chronically neglected.^{6,7} The rapid development of the pandemic is currently showing the overall fragility and impaired response measures of regional public health policies and institutional capacities.⁸ Radiation therapy is an essential, nonelective service. Considering the region-wide existing deficit and centralized distribution of facilities, any threat to radiation therapy capacity in Latin America endangers patients' access to ideal treatment options.^{9,10}

Knowing the current real impact of the COVID-19 pandemic on radiation therapy services across the region might yield insights for cancer control policy. Recently, an impact survey was distributed to radiation oncology practice leaders in the United States by the American Society for Radiation Oncology (ASTRO). This was also administered in Europe by the European Society for Radiation Oncology. With ASTRO's permission, we administered this survey across Latin America to assist in identifying the impact of COVID-19 on our region.

Methods and Materials

ASTRO's permission was obtained to distribute the COVID-19 Survey. Spanish translation was performed by 2 native-speaker radiation oncologists. The survey's content was uploaded to the REDCap online platform (Research Electronic Data Capture, Vanderbilt University, Tennessee) for data storage and analysis in both Spanish and English. National radiation therapy society presidents or key opinion leaders from Argentina, Aruba, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Mexico, Panama, Paraguay, Peru, Uruguay, and Venezuela were individually contacted. They were instructed to distribute the survey exclusively to department

heads or directors. Only 1 answer from each center was accepted.

From May 6 to May 30, the answers were recorded. In total, 26 items between entries and questions were requested to be completed. Data were anonymized to display only the country of origin. The detailed survey in Spanish can be observed in [Appendix EA](#). Frequencies in absolute and percentage values for each field and corresponding median values when applicable were analyzed and displayed, matched with the formulated question in English.

Results

Overall, 229 centers were contacted. Complete answers were obtained from a total of 115 surveys (50.2% response rate) and subsequently analyzed, with 85.2% in Spanish and 14.8% in English. Answers were recorded from Argentina (10.4%), Aruba (0.9%), Bolivia (1.7%), Brazil (17.4%), Chile (6.1%), Colombia (13.0%), Costa Rica (0.9%), Dominican Republic (2.6%), Ecuador (1.7%), El Salvador (0.9%), Mexico (26.1%), Panama (0.9%), Paraguay (0.9%), Peru (14.8%), and Venezuela (1.7%) ([Table 1](#)). Practice financiers were found to be distributed between public (41.1%) and private (50.9%) sources. Other systems were also reported (8%). The median number of radiation oncologists per center was 4 (range, 1-27) and radiation therapists per center was 9 (1-100). Among all participating centers, 87.8% treated 2000 or fewer new patients in 2019, with a median of 600 (24-6200).

Overall, over 97% of practices continued to provide radiation services during the pandemic. Only 2.6% (n = 3) of the responding Latin American centers are currently closed due to the pandemic. Telemedicine was newly incorporated in 64.3% of facilities for on-treatment (29.6%) and posttreatment (34.8%) follow-up. Practices reported a median of 53 (1-490) patients under treatment; however, 80.9% reported a reduction in patient volume (median reduction, 8%; 1%-90%). The estimated revenue decrease was >20% in 53% of answers, whereas 1.7% expected their revenue to increase.

Notably, primaries or sites by affected treatment delays are mostly early stage breast cancer (42.6%), low-grade gliomas (24.3%), low-risk prostate cancer (PC) (67%), intermediate-risk PC (41.7%), high-risk PC (13.9%), nonurgent palliative treatments (23.5%), and nonmalignant

Table 1 Participant countries

Countries (N = 115 responses)	n	%
Argentina	12	10.4
Aruba	1	0.9
Bolivia	2	1.7
Brasil	20	14.7
Chile	7	6.7
Colombia	15	13.0
Costa Rica	1	0.9
Ecuador	2	1.7
El Salvador	1	0.9
Mexico	30	26.1
Panamá	1	0.9
Paraguay	1	0.9
Perú	17	14.8
República Dominicana	3	2.6
Venezuela	2	1.7

conditions (42.6%). Detailed locations and entities can be observed in [Table 2](#).

Regarding personnel safety, staff members are routinely screened for COVID-19 in 74.8% of centers, with 96.5% requiring wearing masks, face shields (80.9%), gloves (77.4%), and gowns (67%). Staggered shifts were implemented in 71.3% of facilities. Notably, 51.3% of facilities experienced personal protective equipment (PPE) shortage. Shortages in staff were mostly reported related to COVID-19 infection (27%) or family member infection (27%). New operational measures were taken, with 85.2% routinely screening all patients at the door of the facility, not allowing visitors (82.6%), and requiring patients to wear masks (82.6%). Quarantine procedures were developed for treatment of known COVID-19-positive patients at a specific daytime schedule (22.6%) or treatment at a specific vault or satellite location (10.4%).

Regarding information resources for COVID-19, 45.2% used ASTRO's COVID-19 information page and 47% used COVID-19 clinical guidance. No ASTRO-associated resources were used in 31.3% of centers.

Interestingly, 58% of responders considered whole-lung radiation therapy to carry positive effects against COVID-19 pneumonitis and would be interested in participating in a prospective trial to investigate this possibility.

All detailed answers with their corresponding absolute and percentual values are shown in [Appendix EB](#).

Discussion

This is the first comprehensive effort to gather information on the impact of the COVID-19 pandemic on radiation oncology in Latin American. Despite tremendous variability in wealth and health care capacities in countries across Latin America, this survey identifies broad effects of

Table 2 What disease sites/treatments are currently being delayed? (N = 115 participants)

Participants	N	%
Early stage breast*	49	42.6
Locally advanced breast	4	3.5
Small cell lung	3	2.6
NSCLC early stage SBRT	3	2.6
NSCLC locally advanced	2	1.7
Early stage definitive HN	4	3.5
Locally advanced definitive HN	2	1.7
Post-operative adjuvant HN	8	7.0
CNS—low grade glioma*	28	24.3
CNS—high-grade glioma	2	1.7
CNS—GBM	3	2.6
GI—Esophageal/gastric	3	2.6
GI—pancreas	1	0.9
GI—liver	5	4.3
GI—rectal	2	1.7
GI—anal	2	1.7
Prostate—low risk*	77	67.0
Prostate—intermediate risk*	48	41.7
Prostate—high-risk*	16	13.9
Bladder	2	1.7
Sarcoma	2	1.7
GYN—cervical	4	3.5
GYN—uterine	9	7.8
GYN—vagina/vulva	2	1.7
Palliative non-emergent*	27	23.5
Palliative emergent	1	0.9
Oligometastatic SBRT	8	7.0
Cutaneous: melanoma	6	5.2
Cutaneous: Non-melanoma*	19	16.5
Nonmalignant conditions*	49	42.6
Lymphomas and leukemia	5	4.3
Pediatric high-grade CNS	3	2.6
Pediatric low-grade CNS	13	11.3
Pediatric solid tumor	3	2.6
Pediatric leukemia/lymphoma	5	4.3
None of the above	20	17.4

Abbreviations: CNS = central nervous system; GBM = glioblastoma; GI = gastrointestinal; GYN = gynecologic; HN = head and neck; NSCLC = non-small cell lung cancer; SBRT = stereotactic body radiation therapy.

* Most frequent results.

the COVID-19 pandemic on the region's cancer care systems.

Preliminary results from the ASTRO's COVID-19 Survey, conducted among practitioners across the United States, have been lately released. Findings highlight personnel and PPE shortages, decreased patient volumes and delays in care, and significant economic impact.¹¹ Despite supply deprivation, general preventive measures have been undertaken in practice, allowing providers to continue uninterrupted treatment delivery. However, a diminution of patient attendance is ongoing, yielding financial shrinkage.¹¹ Based on this experience, major concern is raised for Latin American facilities. Of the consulted institutions, 50.9% are privately financed centers,

which are financially highly dependent on patient influx and thus insurance reimbursement. In addition, a major deficit of PPE is affecting medical practice in the region, impairing radiation therapy services (51.3%) in the same fashion.¹² Another problem arises in terms of dual practice for health care workers in the region; this might be a widely established practice, posing an additional cross-contamination risk.¹³ Moreover, 27% of the consulted centers have reported personnel shortage due to COVID-19.

Determining options for not delaying treatment delivery rests mostly on the potential increased mortality risk of adopting delays. In this analysis, the sites most affected by treatment postponement were early breast cancer, PC, nonurgent palliative treatments, and nonmalignant conditions. For most, despite representing “low-risk” pathologies, unnecessary delay of treatment onset might undermine expected oncologic outcomes and miss curative possibilities for these patients.¹⁴ Options such as hypofractionation, with strong supportive data, should be explored in centers without previous experience as a potential alternative to delayed treatments.

Implementing telemedicine programs could be another beneficial strategy for follow-up schedules, as long as the patient is not required to personally attend. Compared with the US-reported 89% service offer, 64.3% in Latin America have included this feature in favor of the patients. Great advances have been achieved in the past decade in terms of remote controls, mostly through apps specially designed for these purposes; however, logistic limitations such as Internet bandwidth and socioeconomic and geographic characteristics (installed infrastructure) might affect its potential reach. Highlights from the aforementioned results can be observed in [Figures 1 and 2](#).

The novel interest for investigating whole-lung radiation therapy's effects against COVID-19 pneumonitis is another measured parameter in this survey. The willingness to participate (58%) in prospective trials to address this hypothesis should be carefully regarded. Major logistic issues in terms of preventive and protective measures might arise, endangering both practitioners and patients with cancer. Research on these grounds is encouraged only when safety criteria are met.

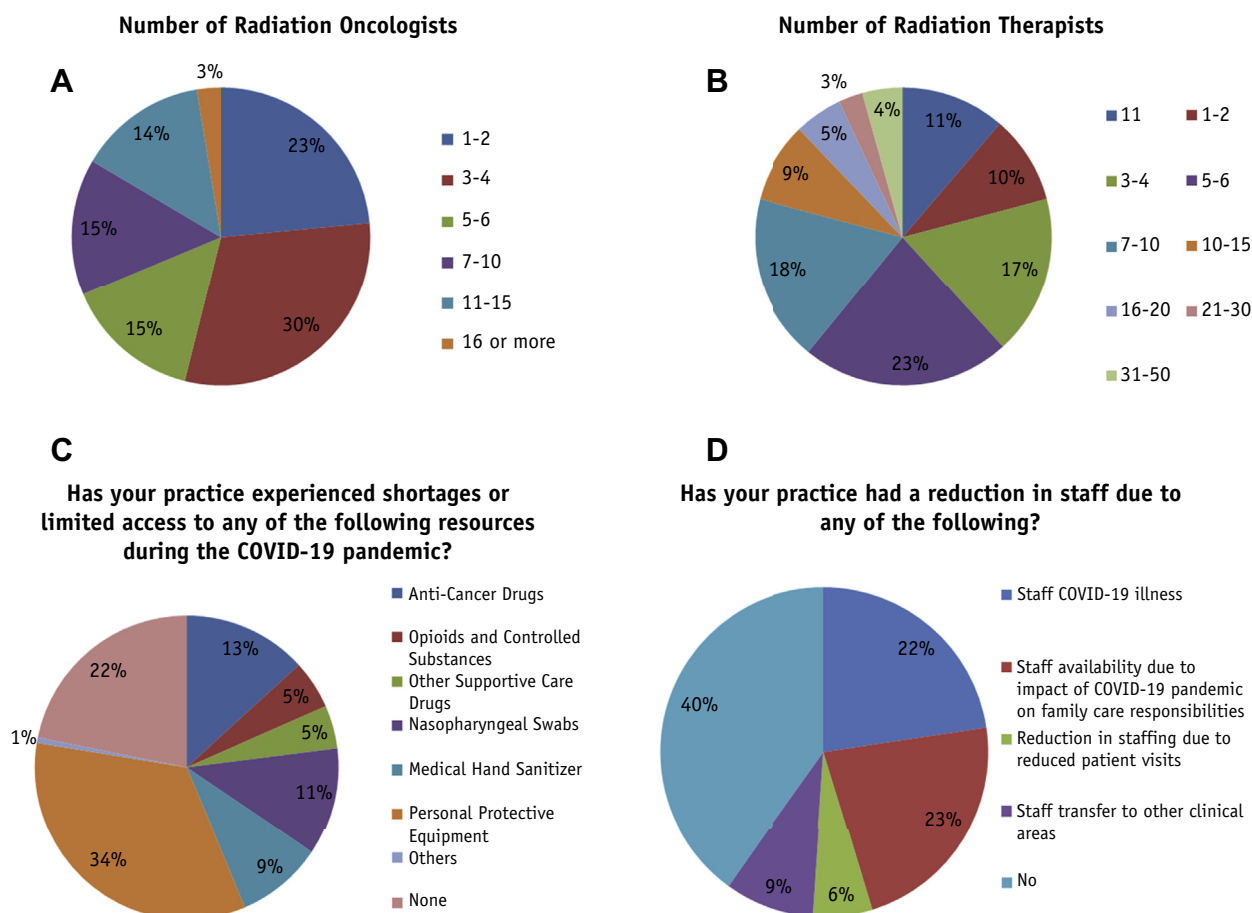


Fig. 1. (A) Proportion of medical practitioners per center. (B) Proportion of radiation therapists per center. (C) Experienced scarcity of resources. (D) Impact on staff attendance.

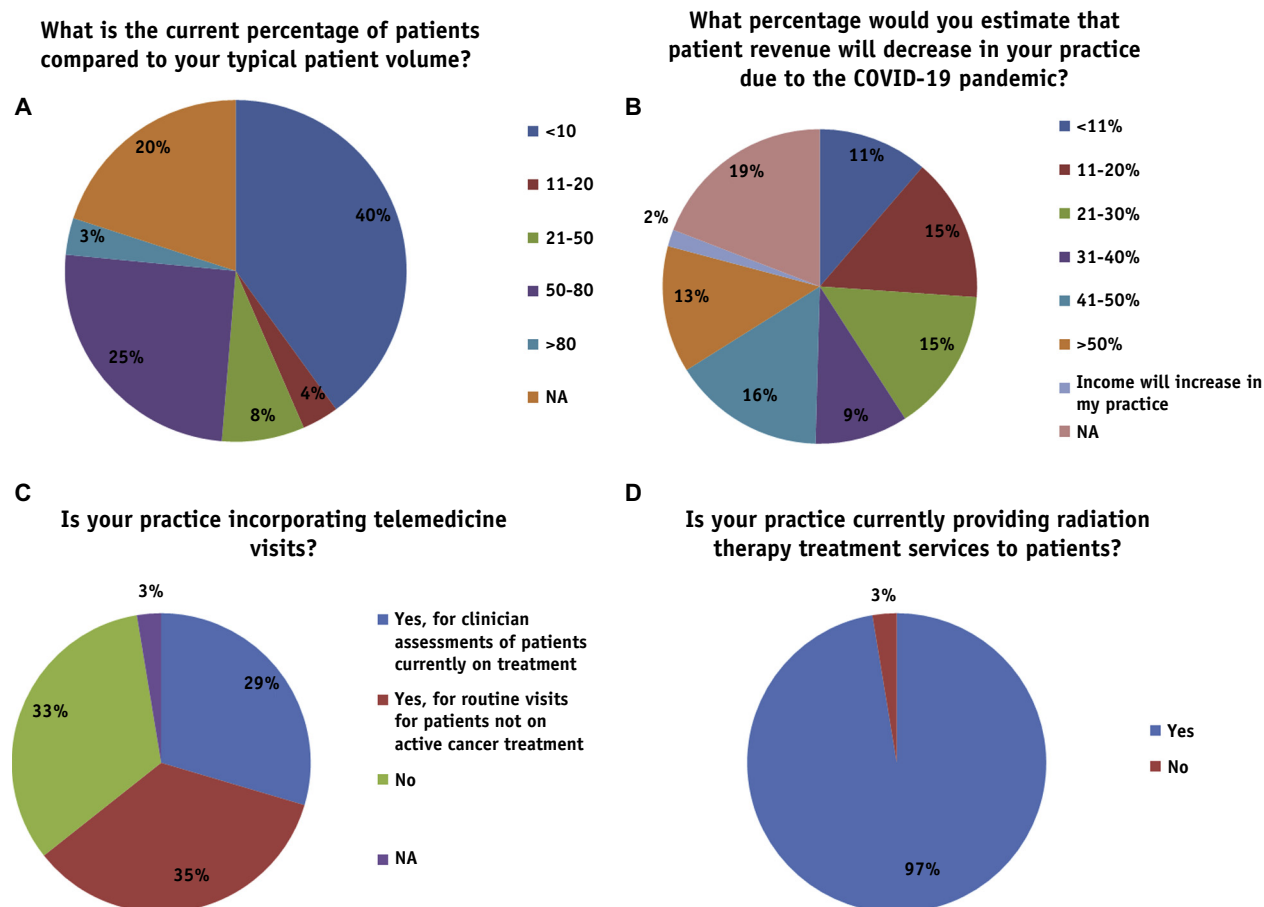


Fig. 2. (A) Impact on patient influx. (B) Impact on revenue. (C) Telemedicine adoption rates. (D) Current working facilities.

Conclusions

Regional information regarding the COVID-19 pandemic in Latin America might help elucidate suitable intervention strategies for both personnel and patients. A follow-up survey will be carried out for dynamic monitoring of the pandemic's impact on radiation therapy services and adoption of ameliorating measures.

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