Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

difference was found in the on-time percentage over the same study period (84.9% vs. 84.2%, p=NS). On-time percentage was significantly higher with the pilot than in the departments which had not yet implemented (94.9% vs. 84.2%, $p<0.0001$).

Conclusion: We found that the pilot implementation of a patient tracking dashboard significantly increased the percentage of patients meeting our quality goal of having charts available for check at least one day prior to start of treatment from 60.0% to 94.9%. The dashboard was easily built internally and implemented without any additional investment. We found that this approach was well received and helped promote safety and efficiency, especially during the pandemic when the department experienced staffing shortages and cross-coverage. We hope to expand use of the dashboard across the system and potentially to other aspects of the care continuum for cancer patients.

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Considerations for Establishing a Theranostic Treatment Site

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Purpose/Objective(s): Here we present guidance to radiation oncology centers in establishing theranostic treatments. Theranostics are radiopharmaceuticals with diagnostic and therapeutic attributes. They are composed of a vector which binds to a target receptor, a linker which connects the vector to the radioisotope and a radioisotope. Theranostics treatment is a multifaceted process including radiation safety, licensing, clinical workflow and supply management.

Materials/Methods: Radiation safety in theranostics requires the management of personnel/patient radiation exposure, decay in storage and disposal of radioactive materials. Decay in storage must satisfy NRC § 35.92. A dedicated toilet is preferable due to renal excretion. NRC § 20.2003 renders excreta from patients exempt from sanitary sewerage restrictions. ALARA-consistent protocols must be implemented to manage personnel, patient and caregiver exposures including: internal contamination, patient education, discharge criteria, and management of time/distance/shielding during preparation, treatment and cleanup. Licensing: An Authorized User and a Radioactive Material License are required and activity usage limits for each isotope must be consistent with the licensing for the site. Table 1 lists common isotopes to consider with varying radiation safety, licensing, etc. requirements. Staff education is paramount for clinical workflow and supply management. Protocols, checklists, and documentation for the concerted efforts of CNMTs, nurses, physics, and attending are imperative for procedures and contingencies. Required equipment: infusion pumps, specialized tubing/connectors, pharmaceuticals, amino acids, contamination control, spill kits, dedicated treatment room, remote patient monitoring, radiation monitoring, radiation survey tools, radiation shielding, dose calibrator, and imaging equipment (e.g., SPECT, Gamma camera, PET CT, etc.).

Results: Adherence to these guidelines allowed successful treatment of patients with ^{177}Lu, ^{233}Ra and ^{90}Y. Dosimetry and radiation survey data confirm successful implementation of rad safety procedures. ^{177}Lu − treated patients were surveyed at one meter hourly to assess uptake/excretion of ^{177}Lu and to confirm safe discharge. Data from radiation monitoring and radiation surveys for treatments will be presented.

Conclusion: A theranostics program can be safely established through an organized effort which considers the factors presented here − radiation safety, licensing, clinical workflow and supply management.

Abstract 3046 - Table 1. Common therapeutic isotopes used in theranostics

Isotope	Emissions (MeV)	Half-life	Disease
Lu-177	Beta (Emax = 0.497) Gamma (0.208 & 0.113)	6.7 d	Neuroendocrine and prostate cancers
Ra-223	Alpha (5.98)	11.43 d	Prostate Bone Mets
Y-90	Beta (Emax = 2.27) Gamma (1.7); Positron	64.2 h	non-Hodgkin's lymphoma
I-131	Beta (Emax = 0.66 MeV) Gamma (0.364 & 0.637 MeV)	8.02 d	Thyroid cancer and more

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Radiation Therapy Decision Making Process and Operations for COVID-19 Positive Patients

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Purpose/Objective(s): A challenging clinical dilemma during the COVID-19 pandemic is management of cancer patients who test positive for COVID. Given the need to balance the risk of disease progression with the risk of transmission to other patients and staff, radiation therapy for these patients requires careful consideration and modification of standard workflows. It is also critical to develop processes to mitigate radiation treatment interruption, which can affect patient outcomes. The objective of this study was to report the clinical operations and outcomes for COVID positive patients receiving radiation therapy during the pandemic at a tertiary cancer center including 2 network locations.

Materials/Methods: During March 2020 to March 2022, the Radiation Oncology COVID committee (RO COVID) developed an integrated process to triage patients, provide treatment recommendations, and implement infection control procedures to safely deliver radiation therapy to COVID positive patients. Policies were created for each center with multidisciplinary input from infectious disease, radiation oncology, radiation therapy, and nursing. All COVID positive patients were presented to the RO COVID group and evaluated for clinical urgency, benefit with radiation, and life expectancy. If deemed necessary, a limited planned break or hypofractionated regimen was recommended to minimize staff exposure. We conducted a retrospective review of COVID positive patients with different primary malignancies treated through the COVID positive pathway.

Results: A total of 68 COVID positive patients were treated with the COVID positive pathway (HN 15, Breast 9, CNS 8, GU 8, GYN, 7, Thoracic 6, GI 5, HEME 5, PED 3, SARC 2). The median age was 57.1 years (IQR 45.8-63.4) and 47% were female. There were 39 patients (57%) who were asymptomatic and were tested for routine pre-radiation screening or due to concerns of COVID exposure. Twenty-three (34%) patients were treated with palliative intent and 8 (12%) were treated for an emergent indication

(i.e., spinal cord compression, bleeding). Thirteen (19%) patients were receiving radiation treatment, had a treatment break (7-21 days), and then resumed their radiation course. All treatments were successfully completed without known nosocomial spread of COVID to staff or other patients. Among this heterogenous group of patients, 58 (85%) were alive with a median follow up of 2 months (IQR 0.5-7.5). COVID infection may have contributed to 3 out of 10 deaths (4% of total cohort). The remaining deaths were due to progression of disease or other non-COVID causes.

Conclusion: In this study, COVID positive patients were safely treated with radiation therapy through a comprehensive decision making and clinical operations pathway taking into account evolving COVID guidelines for three different variant surges. Although limited in follow up, patient outcomes are promising with few COVID-related deaths and low overall mortality rates, even with hypofractionated regimens.

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Radiotherapy Physics Quality Assurance and Management Practices in Less Resourced Facilities: An Initial Pilot Survey in Six Countries Followed by an Onsite Visit and Audit of Radiotherapy Centers in a Lower Middle-Income Country (LMIC)

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Purpose/Objective(s): To assess physics quality assurance (PQA) and practices in less resourced RT clinics to improve the quality of care.

Materials/Methods: An initial survey was conducted in 2020 to thirteen select RT centers in six countries. In 2021, from the survey outcome, our team conducted onsite visits to all the RT-centers in one of the countries: one private, and two public (Public-1- and −2). Public-1 in the capital and Public-2 in a regional capital. Follow-up surveys were sent to 17 medical physicists. Questions centered on the topic of equipment, institutional practice, physics quality assurance, management, and safety practices. Qualitative and descriptive methods were used for data analysis. We accessed operational challenges using a 5-point Likert system: machine downtime, patient related issues, power outage and staffing.

Results: We received a 100% response rate. Six (6/17) had 1-3 years of experience and two (2/17) have over 15 years of experience. Over 80% of respondents had experience with a treatment planning system. Private and public-1 have CT simulators located in RT clinic. Breast, genitourinary, Gynecologic, H&N were the most treated diseases in all three centers. All three (3) clinics have 3D conformal RT (3D-CRT), the private and public-2 have electron treatment modalities and only public-1 have IMRT treatment available. An audit during the visit showed that no single point diode patient specific QA is done for 3D-CRT patients and none of the institutions had a functioning diode to carry out this QA process. The average daily patient workload on external beam device for each clinic was LINAC: Private = 25, public-1 = 55, public-2 = 40; Co- 60: public-1 = 45, Public-2 = 25. Public-1 and-2 lacked the equipment necessary to conform to best practices in TG-142 and 198. Public-2 reported significant challenges in the operational challenges above with values of 4.5, 3 and 2.75 and 2.25. Notably Public-1 and-2 have peer review chart rounds which are attended by clinical oncologists, medical physicists, physicians, and physics trainees. All (17/17) responded to having a system of documenting, tracking, and trending patient related safety incidents but only one (1/17) physicist reported using a voluntary incident reporting system. Although not quantifiable audits during site visits show education and training remains the most important need in operating successful local PQA and management programs. In the initial survey RT centers in lower GNIpc country there was a direct correlation between QA needs and the country index.

Conclusion: The initial study showed a direct correlation between QA needs and the development index of a country which has led to the first of a continent-wide survey intended to spotlight PQA practices in LIMCs, the challenges faced, lessons learned, to help understand the gaps and needs to better support their local PQA and management programs.

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Rate of Radiation Therapy Patient Safety Events by Severity at a Large Academic Medical Center

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Purpose/Objective(s): To determine the rate of patient safety events by severity at a large academic institution. The rate can be used to compare to other radiation therapy institutions and other industries.

Materials/Methods: A voluntary incident reporting system was used to collect patient safety events over a six-year period (CY2016-2021), representing a rather mature state of the quality and safety improvement program that began around 2009. Events were defined broadly as any condition, defect, event, situation, or miscommunication that could have or did reach the patient, with or without harm. Each event was analyzed by a multidisciplinary committee using a severity score and categorized on a scale of 1-6, comparable to that of the Agency of Healthcare Research and Quality (AHRQ) harm scale. A total of 2,583 events were scored in this six-year period.

Results: See Table 1, below.

Conclusion: Rates of events with severity 1-2 declined over time by around 40% over six years. In contrast, the rate of events with severity 3-6, with or without harm, has stayed constant and may reflect complex technological changes, variabilities in treatment planning approaches and issues with coordination of care. Further research is needed to understand why the rate of events with severity 1-2 has decreased, while that of severity 3-6 has stayed constant and how this compares to other radiation therapy centers and other industries.

Abstract 3049 — Table 1

		Events / Number of Treatment Appointments					
Severity	Definition	2016	2017	2018	2019	2020	2021
1	No patient impact and did not reach patient	0.97%	0.82%	0.81%	0.56%	0.57%	0.68%
2	Mild: Reached Pt but no direct clinical outcome	1.00%	0.99%	0.81%	0.58%	0.45%	0.50%
3	Moderate: Clinical impact unlikely	0.10%	0.18%	0.16%	0.19%	0.09%	0.08%
4	Severe: Altered the intended Treatment	0.02%	0.05%	0.01%	0.03%	0.03%	0.04%
5	Life-threatening	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
6	Death	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Total		2.41%	2.09%	1.84%	1.39%	1.15%	1.33%